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CONSERVATION IN EDUCATION

James F. Johnson, Director State Trade Education Shop, Bridgeport, Conn.

A NATION'S most valuable asset is its children, their health, education and happiness!

It is well for us to bear in mind that the mass of our people are born wage earners and that the school education of three-fourths of all our boys and girls never extends beyond their fourteenth to sixteenth years. Hence, it is the natural function of our educational systems to prepare these people toward their future working lives.

A boy who leaves school at this age is handicapped in general training and almost void of any working knowledge along practical lines; and because of his age he cannot enter an apprenticeship. As a result, the occupation into which he usually drifts is of a correspondingly inferior grade and offers little or no opportunity to the boy for development.

As a rule these jobs are readily mastered and the young boy makes a wage that is attractive to him and he rests contented with his lot, sticking to his job, and by doing so automatically blocking his own opportunities for a useful future.

As far as his common school education up to this point has benefited him for his working life, such is almost a mockery!

It is at this condition that the efforts of trade education must center its attack, and rather than be the cause of these wholesome young people actually wasting their years and possibly ruining their whole future by depriving them of a proper education, let it adjust the aim of education to the future lives of those concerned and prepare them for it. For a few years Connecticut has been thinking seriously along this line and has made the first definite step toward conservation. The state legislature has considered the importance of the whole scheme and at the recommendation of the State Board of Education, has appropriated money to run schools such as the present congressional committee is acting upon.

One of the schools, at Bridgeport, now organized for four years, has been running long enough and has completed enough cycles to show that it is in working order and standing up to the test for which it was designed. It has graduated enough apprentices who have been working sufficiently long to prove that the scheme is highly efficient and is sure to bring remarkable results.

This plant is known as the Bridgeport Trade Education Shop. In all respects it is a shop and the students are apprentices. Everything assumes a trade atmosphere and the apprentice is trained in a practical way for the work he is later to follow. By placing these young apprentices under exact shop conditions at this age, and training them consistently, they develop into useful men and women capable of taking their proper places in the world when they start out to work.

This trade school was established to educate in the various trades, boys and girls who cannot continue their public school education beyond that age at which they can earn money in a shop. By doing this it conserves those two years from 14 to 16, and incidentally replaces the old apprenticeship.

In connection with the general plan there is conducted a night school for men who during the day are at work in the various shops at their trade, but who because of circumstances were unable to fully complete it during their earlier ages. The men, who are all over 16 years of age, are offered instruction in printing, linotype operating, shop mathematics, blueprint reading, drafting, architectural drawing, machine work and toolmaking, plumbing and sheetmetal work, cabinetmaking, pattern-making, house framing and carpentry.

For the women, evening instruction is offered in plain sewing and dressmaking, costume design and millinery. While over one thousand apply for this instruction each year only one-fourth of that number can be accommodated.

Another important feature of the Bridgeport plan is the continuation department devoted especially to factory apprentices. All the shops of the city employing apprentices send them one-half day each week to be instructed in those technical studies related to their various trades. These apprentices are paid by their respective shops for the time put in at the trade school and the hours of study count toward their apprenticeship. This work is in charge of a thoro tradesman who well understands the needs and conditions of the apprentices. Each week he visits the various shops in which they are employed to secure such data as will better enable him to further their instruction.

For those young men who have had to leave school and go to work and who cannot attend the all-day trade school, this form of instruction is of great benefit; and while it is not quite so complete as the regular day instruction, it has in many ways aided the apprentice to become of more use to himself and the firm who employs him.

The day trade school for boys is run 49 hours per week, 50 weeks in the year, until the apprentice has put

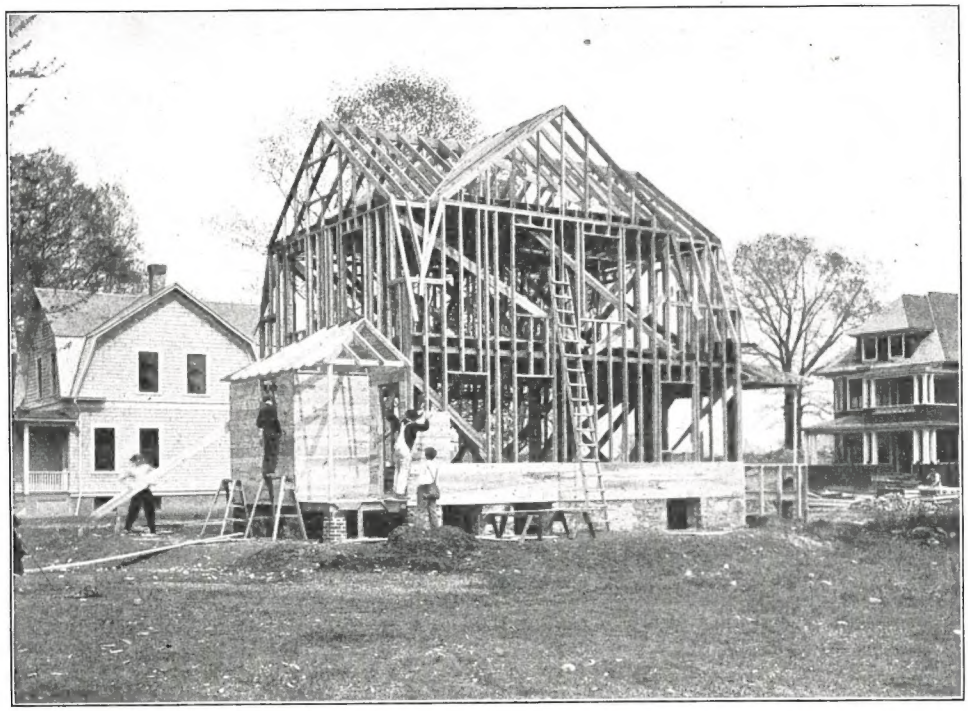
in 4,800 hours of satisfactory and approved work. In the school for girls the day is seven hours for the first year and eight hours for the second year, until 3,600 hours of satisfactory and approved work have been completed.

In both departments about three-fourths of the apprentices' time is given to shop work, while the remaining 25 per cent is devoted to those technical studies essential to the trade and directly related to it.

The boys are trained to be printers, linotype operators, machinists, toolmakers, draftsmen, plumbers and tinsmiths, painters and decorators, patternmakers, cabinetmakers and carpenters, while the girls are trained in homemaking, sewing, dressmaking, costume design and millinery.

the solution of the details and particulars which will later confront them when they go to work at their trade. And so it is that each job in each department goes thru the same routine as it would in the shops outside of the trade school. Each apprentice when assigned a job, knows it by its job number; he figures out the stock required to make it, and lays out the job according to the blueprint or specifications. He is paced in journeyman's hours as to the length of time it will take him to do the job, and the apprentice gets his rating accordingly. Thruout his entire work he is given the proper instruction, making out his own time tickets and job tickets and getting first hand, real shop experience upon actual job work.

As a result of these "shoppy" conditions the print-



TRADE-SCHOOL HOUSE No. 3. CARPENTRY APPRENTICES CLASS AT WORK.

The whole school thruout is organized into shops and each one of these is put upon a commercial basis and run in a businesslike way. To make the whole scheme complete for proper conditions of real trade instruction, all work done has a commercial value and in nearly all cases is done to the customer's specifications.

The condition necessitates that this entire plan measure up to exact trade standards and requirements, and it is this one particular that the Bridgeport school has made so much use of in its unique method of instruction.

In absolutely no case does the money value of production overshadow the great educational purpose of the shops—the "product" might be more exactly called a "by-product." The real product is the trained mechanic. While it is always a good scheme to utilize a by-product, it should in no way become a detriment to the real product.

Thru this scheme, the different departments are each able to present to their apprentices very strongly

ing department is daily engaged upon the same kind of work that these young men will later meet with when they finish their time. Thru it they are taught the various forms of type, composition, proof-reading, make-ready, presswork, layout work and design, and learn to estimate upon job work, making their product under exact commercial conditions and according to the highest standards of the trade.

This method of instruction has accomplished desirable results and has met with the heartiest endorsements of the printing organization.

The machine department running under similar conditions is engaged on job work and the manufacture of its product, a nine inch engine lathe. This machine which comprises the biggest part of the shop work has been quite favorably received by several jobbers, and has created a demand for itself that keeps this entire department running under most desirable conditions for apprentice training.

It is manufactured in a footpower drive, also with

the regular countershaft, and is designed to cut from four to 48 threads per inch. It has a power cross feed arrangement with micrometer collar and is fitted with a compound rest graduated to degrees, also a steady rest and a complete set of change gears for thread cutting. When driven compound a longitudinal feed of 350 cuts to the inch may be obtained.

This lathe is entirely the product of the school. The drawings for it as used in the machine shop and pattern shop are made and blueprinted in the drafting room. These three departments act as a unit the same as in any manufacturing establishment; the drafting room supplying blueprints to the pattern shop which in turn makes from these the patterns. Later the castings which come from these patterns are machined in the machine shop according to prints furnished, also in the drafting room.

In this department the building of such a machine has proven a most desirable medium for instruction. Its construction embraces a wide variety of work that must be done to exact shop requirements. The effect of this upon the student apprentice is very desirable. In connection with his regular shop work the apprentice is regularly instructed in blueprint reading, drawing, shop arithmetic and mechanics, and trade reading, all relating to the work he is following.

Of especial interest are the methods employed and the results obtained in teaching the carpentry trade and the work related to it. It being advisable that these future carpenters be definitely trained in the trade they are to follow, it is planned each year to have them build a house under instruction. This practice of building houses dates back to 1912, and this year the young men completed their third house.

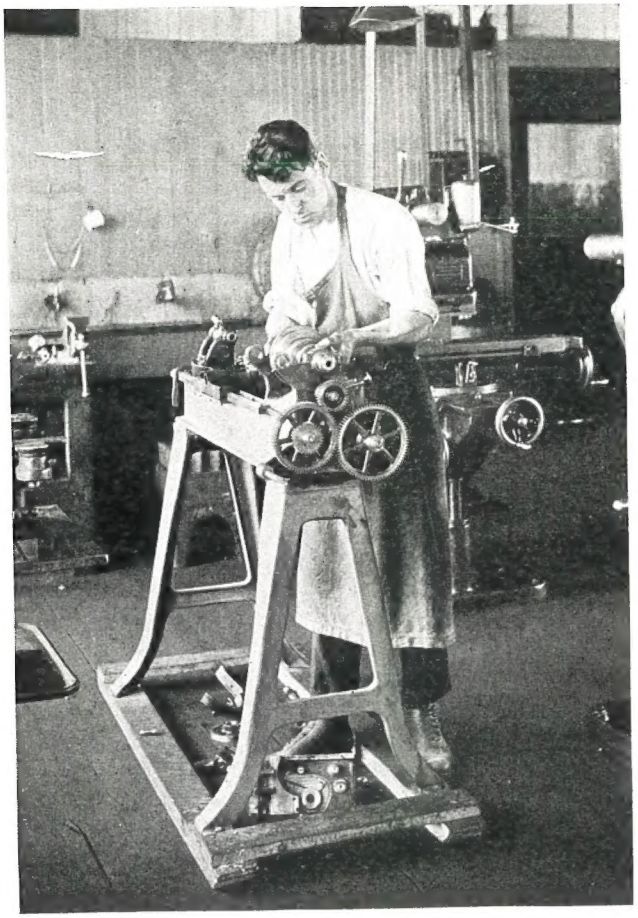
As the photograph shows, it is a fine example of a homelike cottage and furnished ample material for practical building instruction. It is a one family dwelling containing six rooms lighted by both gas and electricity, heated by a hot air furnace and outfitted completely in the most modern plumbing. Downstairs are the kitchen, dining room and living room, with a large hall leading upstairs to three bedrooms and a bathroom. Thruout the house there are ample pantrys, closet space and room for storage.

The roof being of the gambrel type the framing proved an interesting problem. In handling this particular stage of the work the apprentice soon showed himself the master, and as the picture indicates they put up a very creditable frame.

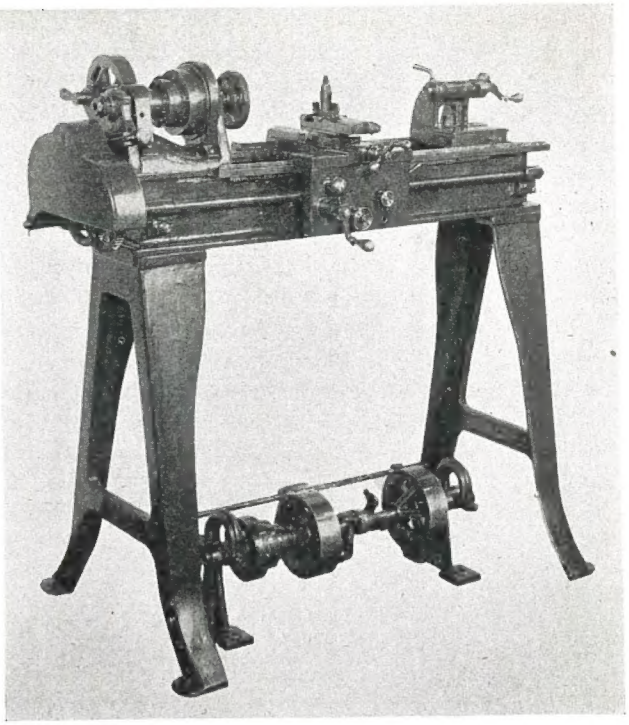
TRADE-SCHOOL HOUSE No. 3 AND THE BOYS WHO BUILT IT.

The shingling also presented a new feature, as a prepared asphalt shingle was used instead of the ordinary wood or slate shingle. From the photograph of the exterior the results of this can be clearly seen.

The interior trim on the first floor is of chestnut and ash and built in a simple but effective design. The stairs were made of ash and constructed in the carpentry shop at the trade school, and later installed at the house. They were designed and constructed by the older apprentices who during the previous year received instruction in



Machine Shop Apprentice Assembling 10-in. Engine Lathe for Test.



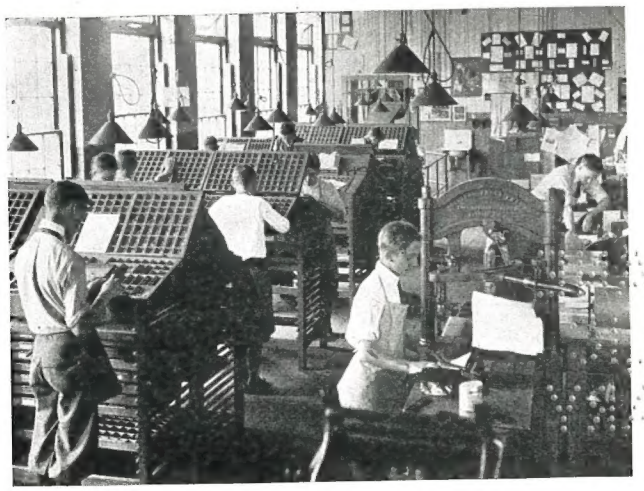
Ten-inch Engine Lathe, Product of the Machine Department, State Trade Education Shop, Bridgeport, Conn.

building house No. 2. The arches are of the same effective pattern as the design of the stairs, and being built of selected chestnut present a most pleasing effect.

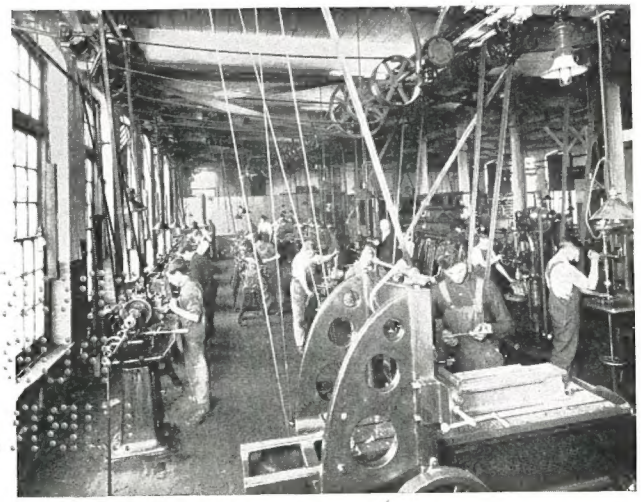
This house was constructed by the apprentice carpenters under the same conditions as would any carpenter building it for a contractor, but for the sole purpose of training them efficiently in a practical way along a line of work they will later follow as their livelihood. The instruction is upon exactly the same kind of jobs along which they will later work, and is followed under conditions that represent the highest standards of the trade.

As a result, the boy receives under careful direction thoro instruction in the highest and best principles of his chosen occupation. Besides this, he receives a general education in matters related to his trade which tend to make him a more complete workman. He is taught to read blueprints, and to make an intelligent drawing, and he is thoroly drilled in the mathematics connected with his work, and accustomed to the reading of journals and magazines of the trade.

The after effects of this training have been studied closely for about two years in graduates who during that time have been at work at their trade. They have all made good from the start, and very early show that they



Print Shop Composing Room.



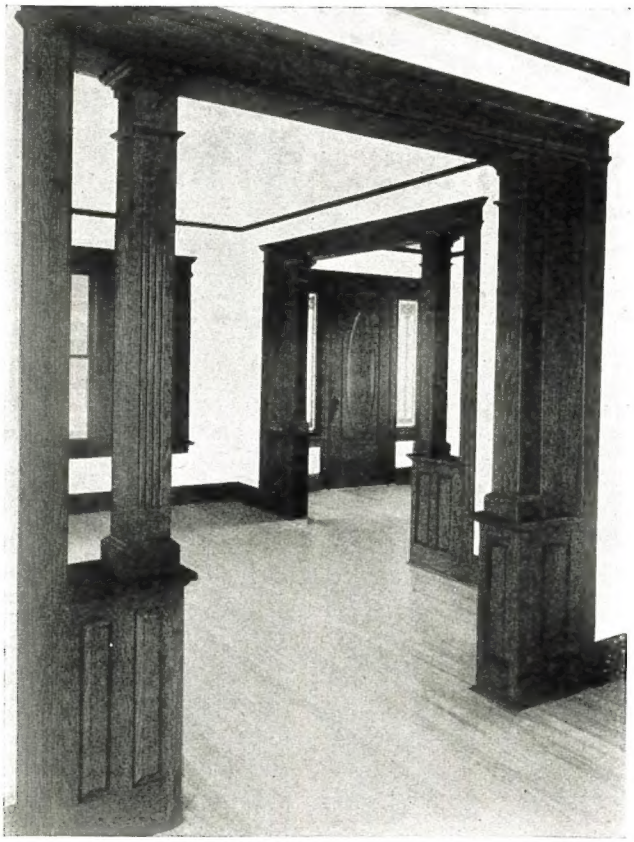
North Side of Machine Shop.

are as competent as the journeyman of many years' experience. They have proven desirable workmen and the demand for them is greater than can be supplied. They have received their trade instruction as a part of their education and have become pioneers in this great national sweep that is soon to advocate the more careful conservation of the nation's children who figure so important in our industrial position.

Without a doubt these young people would have done as many thousand others have done, gone to work in a shop and drifted into a rut of uselessness that would afford them no opportunity to use their God given talents.

Because of custom they might have remained in school until they were 14 years of age with no bearing as to their future lives. After that they would drift into some occupation with no opportunity. Inasmuch as they were not fitted for any particular job they take what they get and become the automaton of the factory. There, as a rule, they stick almost as they began. These form the greater part of the recruits in the great floating army of the unemployed, but if these members were made employable a large division of that army would cease to exist.

The effect of this form of education upon the young people will be remarkable. In the ranks of the tradesmen there will be active young blood which, trained to the highest and best, will have a desirable uplift on the conditions of the trade represented. The corresponding effect upon matters related to it will also be for good, and the results will promote an industrial spirit which will be very effective.



INTERIOR OF TRADE-SCHOOL HOUSE NO. 3.
All Mill Work by Carpenter Apprentices.

SEWING FOR THE GRADES

Janet G. Cation and Annetta B. Cooper, Illinois State Normal University

EXPERIENCE in Normal School work shows that there is a demand, at the present time, for a detailed description of a suggested course of study for elementary grades which may be followed by teachers who have not had special training in Household Art.

Since a large part of all sewing courses consists of hand sewing, and continual repetition of the same stitches is necessary for good work, it is well to start with hand sewing as a foundation. The common fundamental stitches form a good basis for such a course. Formerly, these were taught on samplers, but the present tendency continues toward their application to useful articles. The teacher's unceasing efforts should be turned toward the discovery of interesting and purposeful problems.

There is an unlimited number of attractive articles from which she may choose. The environment plays an important part in their selection. The mining district, the factory town, the college community, and the rich suburb all have their own distinctive characteristics, and the respective courses of study must vary to suit the needs of each. It is readily seen, therefore, that a "cut and dried" course that will suit every school is impossible. The teacher in each community should retain the idea of teaching the fundamental stitches as the nucleus of her thought, and with an alert and open mind be ever watchful for the best for her curriculum.

There are four points to consider before deciding upon any problem. (1) the child's interest in it, (2) its usefulness, (3) its cost, and (4) the amount of time consumed in its construction.

If sewing has never been taught before, as such, the children will doubtless enter into it with a great deal of interest and enthusiasm. In order to hold this healthful interest, the teacher should use judgment in the selection of her first problems. In beginning sewing a new set of physical adjustments must be made by the child. She will have difficulty with the threading and manipulation of the small needle, and the wearing of the seemingly unhandy thimble, to say nothing of her realization of the standard of stitches she may have set for herself to attain.

It is well, then, that the first problems be short, for if mistakes are made there will be the encouraging thought that a new beginning will soon be made and a better product may result. As the course advances, garments requiring a long period of time in construction may be introduced provided they afford a sufficient variety of stitches, seams, facings, etc., and above all are useful.

Problems containing beautiful materials and artistic color combinations go a long way toward holding and reviving the interest of the children. Faces will brighten when pretty ribbons or flannelette are to be used, but the expression changes when gingham pieces are handed out for patches. So long as children are interested they will make every effort to keep their hands and work clean and will put forth a greater effort to take careful stitches.

The interest in any sewing problem will be greatly intensified if the child is continually conscious of the fact that the finished product has a value, and can be put to good use by herself or someone for whom she cares. This worthy aim of usefulness should be held constantly before the class. The interest will be still more keen if this utilitarian article is right up-to-date, and one which the most modern living demands.

The child will probably think little about the cost of the sewing course, but the teacher should have consideration for the parents and endeavor to co-operate with them in this respect. Ordinarily, if the articles are useful, the materials economically cut and carefully made up, no objection will be made. It seems reasonable to keep the cost of the sewing course the same as the average cost of a textbook.

Regarding the amount of time consumed in the construction of any article, perhaps enough has been said. It is well to start with a short problem, but not necessary that all should be so. Children enjoy making garments which require as much as three months of time, sewing 45 minutes daily. In the sixth grade of the training school of the Illinois State Normal University, the girls' unanimous choice of their entire course is the kimona gown, which covers a period of three months of their sewing time.

Class instruction is superior as compared with individual instruction; for ordinarily the majority of the class will be able to follow the directions, consequently there is a great saving of time. Individual instruction cannot be avoided because all do not work at uniform speed, hence there is the problem of the fast and the slow worker. Extra problems may be kept on hand for those most speedy. The Associated Charities or visiting nurses' association will often co-operate with the teacher of Household Art by furnishing materials for simple garments which the girls delight in making. This may serve as an incentive for neat, quick work. The girl who works most rapidly should be watched for two reasons: (1) the quality of her work, (2) the necessary preparation of the next or the extra problem.

It is seldom that girls should be permitted to take their work home, for they make mistakes, lose it, get it soiled, and, too often, forget to bring it back.

It is desirable that the teacher buy the materials because she can select the kinds that are best suited to the purpose and she has them ready just when they are needed. If sewing is taught but once a week, as in many schools, and if a girl is absent on sewing day, she fails to get the assignment, so is seriously handicapped by not having her materials the day a series of lessons is begun. Some people argue that the children should get the experience of buying. When they do garment work it may be desirable for them to purchase their own materials, for usually the mothers have definite ideas of what they

want the girls to wear. For example, where the problem is the kimona night gown, the same stitches could be taught on muslin, crepe or flaxon. Before girls buy materials the teacher should have a lesson on the choice of materials and she is further safeguarded if girls bring samples. Over and over muslin loaded with starch is brought to the classroom because of inability to tell by the looks, or feel, that the adulterant is present.

The following course is planned for the fifth, sixth, and seventh grades and is based on the common fundamental stitches. The time allowed for sewing is one hundred and twelve minutes per week. These stitches are repeated each year in a new form. An examination of the course shows that the running stitch is taught on one article in the fifth grade, another in the sixth and repeated on still another in the seventh.

The same thing is true of the other stitches. The problems should be changed from year to year in each grade so that the children will not anticipate the course. Then, too, if a child is repeating a grade, she will have a feeling that she is progressing in sewing.

Course of Study for the 5th Grade.

Problem	Article	Time	Supplementary Problems
Basting Running	Duster	2 weeks	Silver case, towel, slippers, slipper case, dress protector, quilt patches
Hemming	Towel	3 weeks	
Outline Darning Binding Hemming	Baby's bib	3 weeks	
Blanket stitch Overhanding	Baby's bootees	2 weeks	
Overhanding and gathering of lace	Sachet	2 weeks	Iron holder
Combination	Gretchen apron and cap trimmed with rickrack braid	12 weeks	Serving apron
Darning	Stockings	2 weeks	
Knitting	Slippers	10 weeks	

Problems for the 5th Grade.

Desk bag	Sachets	Pillow cover
Spoon case	Slipper bag	Knitting
Eiderdown slippers	Dress protector	Gingham apron
Darning	Iron holder	Calico apron
Canvas needle book	Wool petticoat	Crash dresser cover
Canvas napkin ring	Towel	Pin cushion top
Baby's apron bib		Baby's felt shoes

Cheesecloth Duster.

Materials:

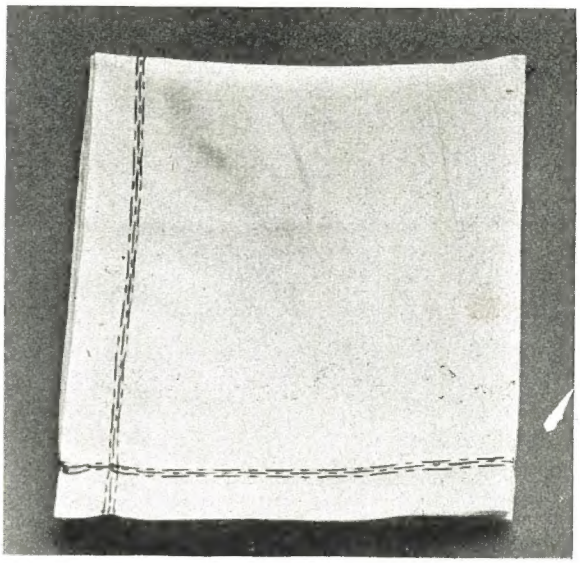
1 yd. cheesecloth
D. M. C. in color.
Cardboard measure.
Number 8 crewel needle.
Thread for basting.
Pins.

Method:

Remove the selvedges and straighten edges by drawing threads. Fold a one-inch hem (turning ¼ inch then 1 inch) on all four sides, folding first the top and bottom then the right and left sides. Pin and baste on the edge with ¼ inch stitches. Sew the hem down with a pleasing arrangement of the uneven basting stitch.

Directions for uneven basting:

The uneven basting is made up of a long (½ inch) stitch on one side of the cloth and a short stitch on the other side.



Cheesecloth Duster.

Note.—It is much easier for little children to measure with a cardboard ruler than with a tape or stick. The cardboard rulers may be made from any heavy paper cut in lengths correponding to the measures to be made.

A hem is made by twice folding over the edge of a piece of cloth toward the worker and sewing it down.

Baby Bootees.

(Blanket stitch and overhanding stitch.)

Materials:

White felt 9 by 12 inches (for pair).
Mercerized cotton in color.
Crewel needle number 4.
Needle number 7.
White thread number 40.
Two shoe buttons.

Method:

Cut bootees by pattern. Blanket stitch all of the edges with colored mercerized cotton, except straight edges in the back.

Overhand back edges with white thread. Overhand the top part to the sole on the right side.

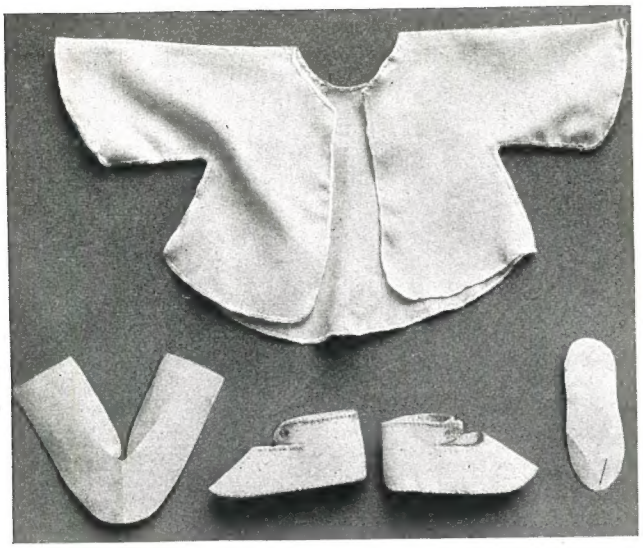
Fasten the straps with unworked buttonhole and button.

The Blanket Stitch.

Hold work over the first finger of the left hand with the raw edge toward the worker. Make the upright part of stitch at right angles to the raw edge of the material and the loop over the edge. Fasten the thread by taking two small stitches along the edge on the under side. Begin a new thread by running a stitch back of the last stitch, catch the new thread thru the loop and proceed as before. In a corner, three stitches should come in the same hole. Continue the stitches the same height and the same distance apart.

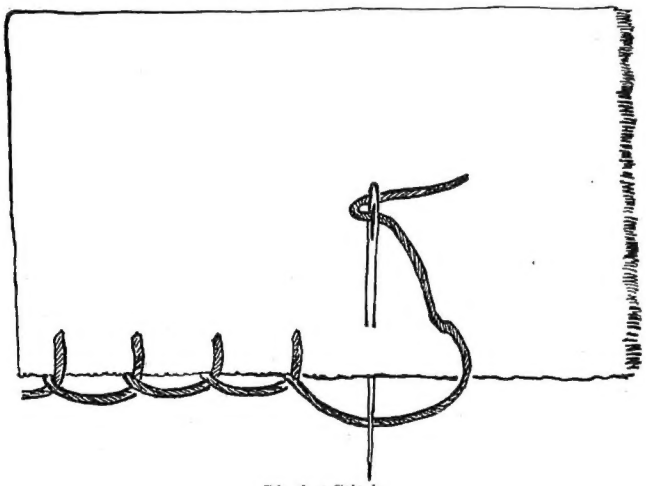
The Overhanding Stitch.

Hold the material perfectly straight between the first finger and the thumb of the left hand. Insert the



Baby's Bootees and Pattern. Above, supplementary problem in blanket stitch.

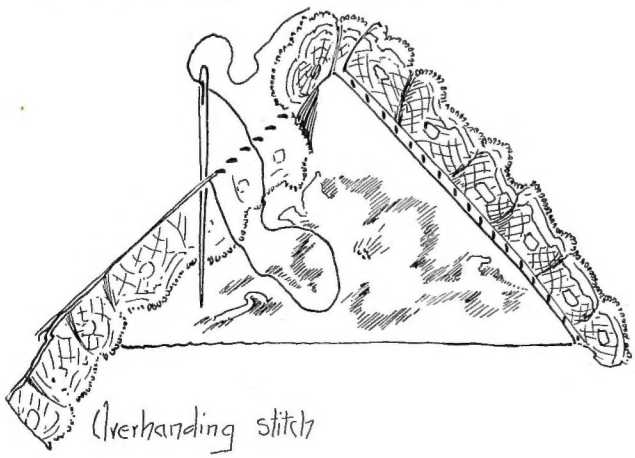
needle at right angles to the material taking very shallow stitches 1-16 inch apart. Leave ½ inch of thread along the edge to be fastened down by the first few stitches of the new thread. Draw the new thread thru excepting ½ inch. The ½ inch of old and the ½ inch of new should be kept together between the edges of the work and sewed down by the next stitches.

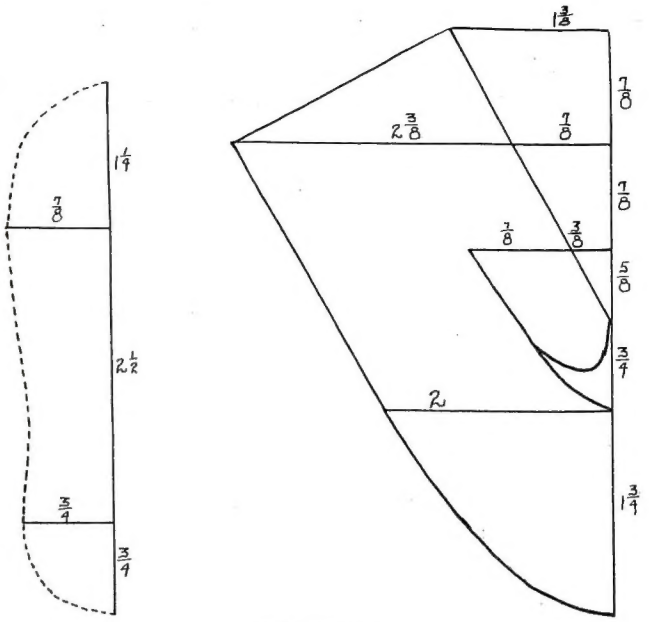


Blanket Stitch.

Material: **Hemmed Towel.**

27 inch huck toweling — Number 70 white thread.
D. M. C. in color. — Number 8 crewel needle.





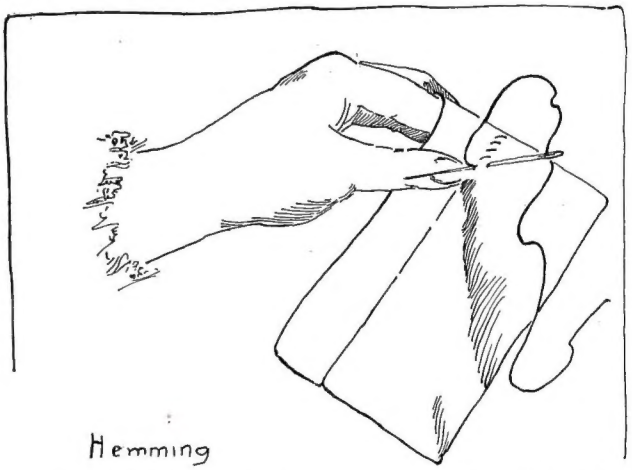
Bootee Pattern.

Method:

Straighten the ends by drawing a thread. Fold and baste a one-inch hem in each end of the towel. Overhand the end of one hem, sew the hem, then overhand the other end. Finish the other end of towel in the same way. With colored D. M. C. make a design by darning thru the raised threads of the huck. A wider design should be put in one end than in the other. Fasten threads inconspicuously.

Note:

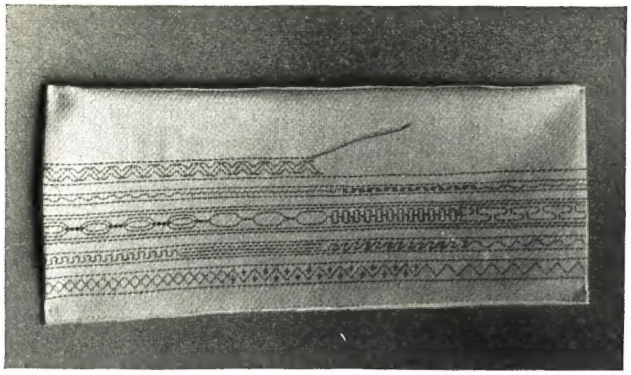
The teacher should be careful to select huck that has the little raised threads going as nearly straight across the materials as possible, otherwise the design will not follow the hem.



Huck has a right and wrong side. The little raised threads are parallel with the selvedge on the wrong side. In this towel the hem is turned to the right side.

The Hemming Stitch.

This stitch is placed on the inside edge of a hem. Lay the basted hem over the first and under the second finger of the left hand with the folded edge outside. Hold it in place with the thumb. Conceal the fastening of the thread. Pointing the needle over the left shoulder take a small stitch thru the material and then thru



Designs for Towel Ends.

the edge of the hem. Uniformity of slant, size, and the spacing of stitches are most important.

Sachet.

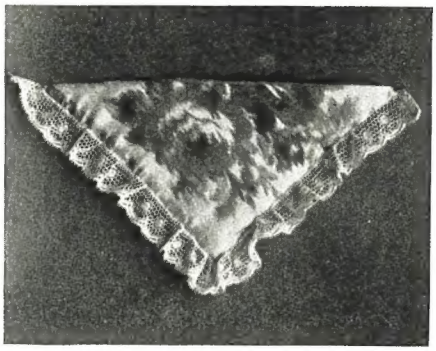
(Overhanding and sewing on lace.)

Materials:

Fancy ribbon 5 by 5½ inches.
White silk thread.
Sachet powder.
One-half yard of ½ inch valenciennes lace.
Cotton wadding 5 by 5 inches.

Method:

Turn in raw edges of ribbon ¼ inch. Lay cotton wadding on top of it. Sprinkle with sachet powder. Fold diagonally and baste edges together, keeping them very even. Fold hems, baste, and hem ends of lace. Find



Sachet.

the center of the lace and mark with a pin. Gather lace by pulling a thread in the edge; baste to sachet, putting center of lace at right angled corner of sachet. Overhand both edges of ribbon and lace, holding lace side toward worker.

Baby Bib.

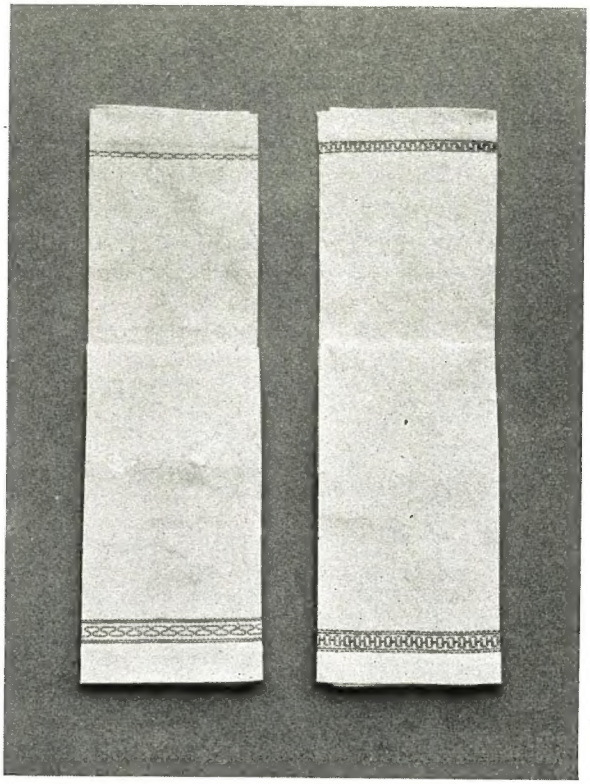
Materials:

1-3 yard of huck toweling.
D. M. C. in color.
1 yard ½ inch straight tape.
Number 70 thread.
Number 8 crewel needle.

Method:

The width of the material forms the length of the bib. Straighten the raw edges by drawing a thread.

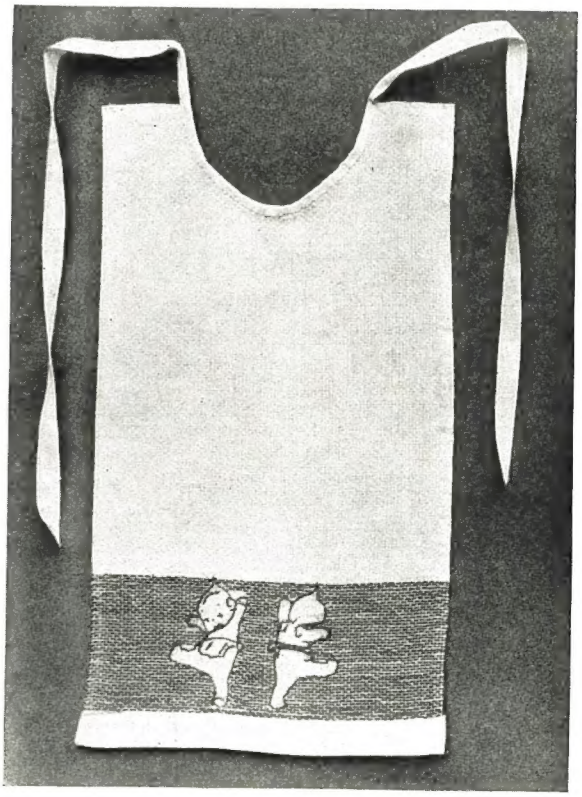
Measure 2½ inches from one selvedge and half the distance from one raw edge to the other. At ¼ inch on each side of this point place the outline of two kewpies,



Towels with Designs in Darning.

then using the D. M. C. work the diagram with the outline stitch.

Leave enough space on the sides for a ¼ inch hem. With D. M. C. darn back and forth across the bib the depth of the figures. Place a one-inch hem in the bottom of the bib and a ¼ inch hem on the two sides.

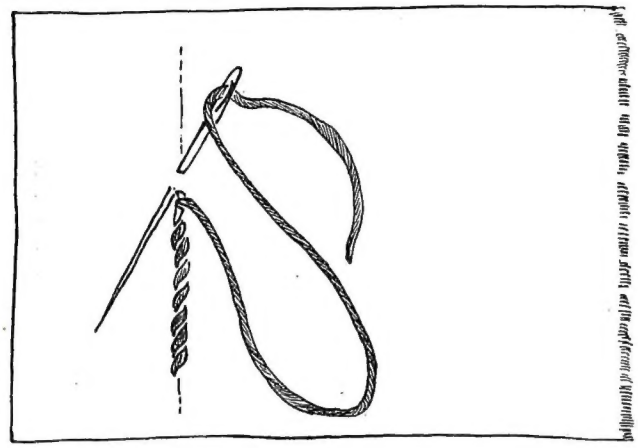


Baby's Bib.

Shape the top to fit the neck. Hem (¼ inch) edge beyond neck line and bind the curve with straight tape.

The Outline Stitch.

The outline stitch consists of a long stitch and a short one. The long (⅛ inch) one covers a traced line and is taken *away* from the worker; the short (1-16 inch) one is on the wrong side of the material and is taken *toward* the worker.



Outline Stitch

Gretchen Apron and Cap.

Materials:

2¾ to 3 yards of calico, depending on the required length of the apron.

2 2-3 yards rickrack braid.

Number 70 white thread.

Number 7 needle.

1-6 yard narrow elastic.

Small button.

To cut Apron and Cap:

Place long line of pattern on a lengthwise fold of material and cut around edges.

The large scraps left at the armholes may be used to piece the sides of the front. After cutting the cap with the long line on a lengthwise fold of material the remaining pieces may be used for piecing the sides of the back, and for a belt.

If a pocket is desired cut it from the piece formed when cutting out the neck.

Gretchen Apron and Cap.

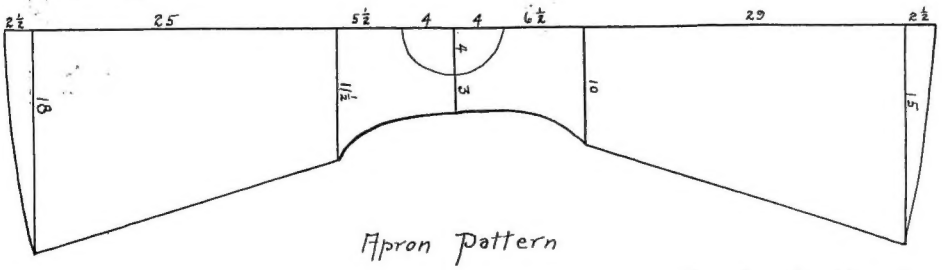
one end of belt to side seam of apron just below the armhole. Fasten other end with button and buttonhole.

To sew cap:

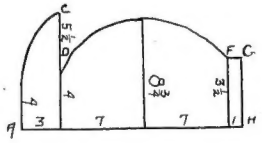
Make a ¼ inch hem on line FG and a ¾ inch hem in the bottom of the cap GH, and a ¼ inch hem at the top or line AC. Gather DF into 5½ inches. Join DF to DC with a French seam. Sew rickrack to front as in apron. Run rubber in ¾ inch hem at the bottom and sew the ends with overhanding stitch.

The combination stitch:

The combination stitch consists of two small running stitches and one small back stitch over the last running stitch.



Apron Pattern



Cap Pattern.

To sew apron:

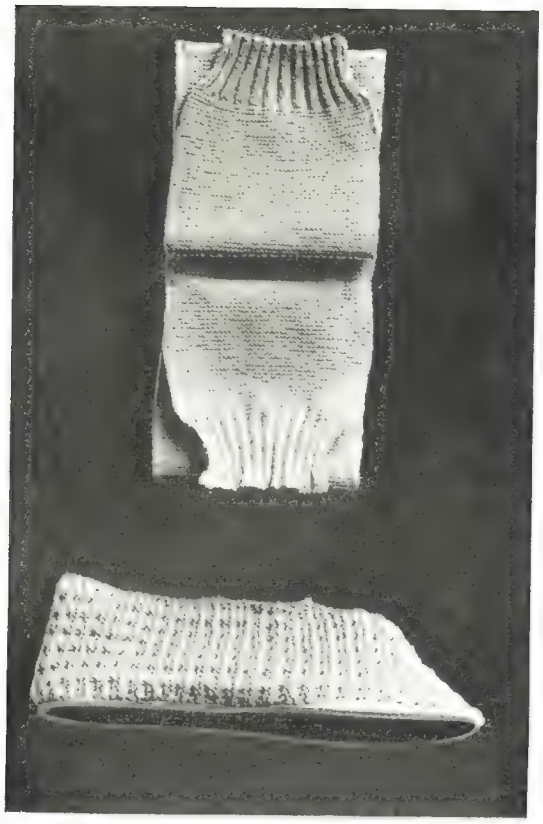
Baste gores to the body of the apron and sew using the combination stitch. Baste underarm seams and sew with a French seam. Fold, baste, and hem neck and sleeves with a narrow hem. Even the length of the apron and place a 3 inch hem in the bottom. Hem all edges of the belt with a narow hem. Overhand points of rickrack to edge of neck, armholes and belt. Overhand

Directions for French seam:

Make a ⅛ inch seam on the right side with the running stitch. Turn to the wrong side and make a seam ¼ inch wide using the combination stitch.

Knitting.

Knitting involves six fundamentals, namely, casting on, plain knitting, purling, increasing, decreasing, and binding off.



Knitted Muffler and Knitted Slipper.

Four of these may be taught to fifth-grade girls.

Casting On.

One yard from end of yard make a slip knot. Insert knitting needle into this loop. Hold the needle between the thumb and first finger of the right hand. Hold the yard end of the yarn close to the loop with the right hand, placing yarn around the fourth finger, under the second and third, and over the first.

Close to the loop, bring the yarn connected with the ball around the thumb of the left hand from the front to the back, and hold tight with the third and fourth fingers.

Slip the point of the needle under the loop around the thumb, throw the right hand thread under it from right to left, draw it thru the loop with the point of the needle, thus forming a new loop on the needle and removing the old one from the thumb.

Plain Knitting.

Hold needle containing stitches in the left *hand,* between the thumb and the first finger; slip the second needle under the first loop from left to right, holding the yarn over the first finger, under the second and third, and around the fourth. Throw the yarn under the needle from right to left, draw it thru the loop onto first needle; slip the loop off of the first needle. Proceed in the same manner for all other loops.

Purling.

Hold the needle and yarn as for plain knitting. Throw the yarn in front of the right hand needle, slip the right hand needle thru the loop, letting it come over the left hand needle; throw the yarn over the right needle from left to right and draw thru the loop, slipping the loop off of the first needle.

To Bind Off.

Slip the first stitch from the left to the right needle, knit the second; slip the left needle under the first loop on the right needle, draw the second loop thru this. This drops one stitch, and leaves one on the right needle; knot a stitch, and proceed from the start.

Materials: **Knitted Muffler.**

Two skeins yarn.
Two knitting needles.

Method:

Cast on forty stitches, and knit plain to the required length. Nothing more complex than this should be given in the beginning. Pupils having had some practice in knitting, may elaborate upon this problem, by finishing the ends with a ribbed border, which is made by knitting two and purling two across, for as many rows as the border is deep.

Table Showing Cost of Articles for Fifth Grade.

Article	Materials	Per Yard	Cost	Total Cost
Duster	1 yd. cheesecloth @.....	$0.10	$0.10	
Bootees	½ skein D. M. C. @.....	.03	.02	$0.12
Towel	White felt 9 x 12 inches....	2.00	.07	
Sachet	Mercerized cotton			
Baby's bib	2 shoe buttons.....		.01	.08
Knitted	27 in. linen huckaback @...	.25	.18	
muffler	½ skein D. M. C. @.....	.03	.02	.20
Kimona	5½ inches ribbon @.....	.25	.04	
apron	Sachet powder		.02	
	Lace, ½ yard @.....	.05	.025	
	Cotton 5 x 5 inches.....		.005	.09
	1-3 yd. cotton huckaback @..	.12	.04	
	1 skein D. M. C. @.....	.03	.03	.07
	2 skeins yarn @.....	.10	.20	
	2 needles @.....	.01½	.03	.23
	2 2-3 yds. calico @.....	.06	.16	
	2 2-3 yds. brain @.....	.03	.08	
	1-6 yd. elastic @.....	.03	.005	.25

THERE is work that is work; there is play that is play; there is work that is play; there is play that is work---and in only one of these lies happiness.

—*Gelett Burgess.*

An Architectural Lettering System for Secondary and Vocational Schools

Otto E. Brunkow, Stout Institute, Menomonie, Wis.

POOR lettering detracts from the interest and value of the finest rendering; good lettering, on the contrary, improves an otherwise poor and careless drawing. Among instructors of elementary architecture (in vocational, normal, and high schools), unfortunately, there are some who fail to teach good lettering, probably because they themselves have not the proper respect for it; or because the system of lettering which they employ lacks organization according to logical principles, and, instead of making a lively impression upon the student's love of reason, it lies inert on the same plane as the exercises in the copy book.

The college student works amid particular influences. He studies in an architectural atmosphere, and develops a lettering system consistent with his style of rendering, but the secondary school course is necessarily so limited in theory of design and composition that its students have no chance to acquire such development. In view of existing conditions, we may conclude that a style of architectural letters for use on plans and working drawings should be presented to normal secondary, and high-school students as a problem to be worked out and studied. Such a problem may be organized in accordance with the following outline:

1. A good lettering system must be developed from some model which has been the standard lettering and type style during the longest period of time.

2. An architectural system for use in secondary schools must be developed in a similar manner and must be derived from a model with which the students are familiar.

3. A freehand architectural style is informal, as compared with mechanical and typographical styles.

4. An informal system must be developed from a formal system.

5. An architectural style for secondary schools must be practical.

6. The system must be demonstrated and presented to a class.

7. Judgment should be exercised in making corrections and criticisms.

The System Must Be Developed From a Standard Model.

The modern letter, as used in print, was derived from the Roman, Gothic, and Unical forms. The type commonly used in printing school texts and reference books (hence the style with which the student is most familiar) was developed from early Roman forms. (Figure 1.) A study of the constructed letters (Figure 1) reveals the fact that the classic Roman characters are modelled within a square, nine units long by nine units wide. In the study of architectural history, it is interesting to note that, altho the changes that have occurred in forms and styles of lettering were no less numerous than those occurring in the field of design, yet there is one style which has survived as the fittest for general use. This is the Roman style. Figure 2 (Century Expanded) illustrates a modern typographical capital alphabet derived from the classic Roman.

An Informal System.

Architectural drawings require a style of lettering harmonious and consistent with the nature of the rendering. Such a style, therefore, must have sufficient formality to lend itself to freehand and sketchy treatment, as well as to the mechanical. The style illustrated in Figure 3, meets these requirements, inasmuch as the freehand and mechanical phases of drawing demand, but the curves are too symmetrical and the proportions are too uniform and precise to be consistent with a sketchy treatment. A modified system is illustrated in Figure 4. While being capable of free and easy execution, still the curves remain sufficiently conservative in form to accord with mechanical exactions.

Development of an Informal System.

The trained and experienced architect develops a pleasing style of informal lettering thru constant practice. The beauty of his characters lies not alone in proper and pleasing form, but also in the skillful execution of each line. It is a task, indeed, to transmit such skill to secondary school students, who are often uninterested and untalented, and yet anyone with average ability should have no trouble in mastering a style if it is presented properly. Figure 4 illustrates a simple, conservative style—developed from the Roman—which may be characterized as follows:

1. Dissimilarity in proportion of the various parts, as in A, B, E, H, K, M, R, etc., allows a sufficient margin for inaccuracy to make rapid execution possible.

2. The vertical axis is slightly longer than the horizontal—C, D, G, H, M, R, T, W, etc.

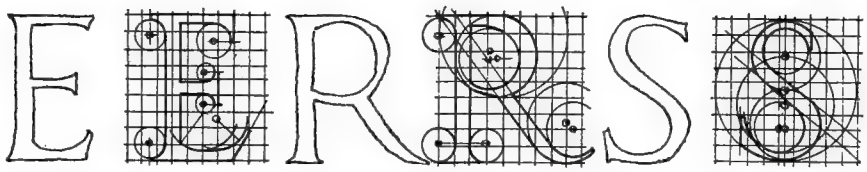
3. The serifs—uniform in weight thruout their length—should extend only a trifle outside the guide lines, and should not be so long and prominent as to render them more conspicuous than the characters themselves. C, E, F, L, M, T, etc. (Figure 5), are improperly finished with serifs. Compare these with the same characters in Figure 4.

4. Horizontal bars in A, E, F, and H extend a trifle across the vertical lines.

5. For rapidity of execution, the curves involved in C, D, G, R, P, S, etc., are elliptical, and are made in two or more strokes.

The System Must Be Practical.

Altho a style of architectural lettering for vocational and high schools must be such that it can be presented to a class, still it should retain the characteristics that make it a practical style. The letters must be capable of rapid execution. The style must be simple and not too mechanical. The forms must be developed from a classic alphabet. Flourishes and fantastic appendages should have no place in the system.



• Fig. 1 •

ABCDEFGHIJKLMN
OPQRSTUVWXYZ&

• Fig. 2 •

ABCDEFGHIJKLMNOP
QRSTVUWXYZSTOUT

• Fig. 3 •

ABCDEFGHIJKLMNOP
QRSTVUWXYZSTOUT

• Fig. 4 •

ABCDEFGHIJKLM
NPQRSSTVWXYZZB

• Fig. 5 •

A style of lower case letters for notations
on plans and details
— aabcdeefghijkklmnopqrsrttuvwxyz —

·12345·	•FIRST FLOOR PLAN•	·67890·

• Fig. 6 •

The System Must Be Presented.

Many instructors introduce or "expose" an uninterested class to an architectural alphabet and, without further ceremony or explanation expect the student to grasp all the ideas embodied therein. Such practice is comparatively as absurd as an attempt to instruct an arithmetic class in the principles of division by having the pupils copy problems that have been solved previously by the instructor. The characters shown in Figure 5, are examples of this method of instruction. A better method is the one which acknowledges the existence of the omnipresent "why's" and which answers them. The underlying principles of the style are explained and illustrated, and members of the class are called upon after such presentation to construct letters without a copy in sight. It is a waste of time to have students make a model copy of freehand architectural letters at a much larger scale than they will actually use them. Often it is contended that such large characters render it easy for the student to understand the style, shape, and proportions, but it is preferable that the presentation and demonstration by the instructor should make those principles clear before the class commences lettering plates. The beginner finds it quite different to make letters offhand at a small scale than to construct them so large and so slowly that accurate measurement and laying out of each division is possible. Ability to effect reductions in size must presuppose a keen sense of proportion on the part of the pupil, and such a talent is not commonly found. The lower case alphabet (Figure 6) is much simpler than the caps, and for this reason it should be taught first. This training in freehand lower case lettering prepares the student for the more difficult capital alphabet.

Judgment in Correcting.

To avoid confusing the pupil, only his most vital mistakes should be corrected at the outset. If the student has previously mastered a mechanical style he will tend to commingle it with his architectural style until he determines, thru practice, how and where the differences are to be found. Nothing is quite so discouraging to the beginner as to have an instructor point out an error—perhaps a multitude of them—and advise the student to make the letters as represented on a perfect copy plate, which is often drawn to a much larger or smaller scale. Copying without a thoro knowledge of principles is a practice that should be discouraged.

Observation of the following is necessary for the successful teaching of architectural lettering:

1. The instructor must know and be able to use a good lettering system himself.
2. He should be able to analyze and organize it for presentation to a given class under given conditions.
3. He must present each character so that the student will understand it.
4. He should correct the student from time to time, and only when such correction will result in improvement.
5. The student must be held to the highest possible standard of his ability.
6. The instructor should make the work interesting, insofar as he is able, by requiring particularly interesting drawing plates to be lettered.
7. He must give his individual attention to each student, as far as that is possible.

THE NEEDLE.

Who masters not in Youth the woman's tool,
Proud, trivial or unapt, she is a fool.
The Plough, the Sword, the Pen to man we leave,
But ours the *Needle* since the days of Eve.
Then happiest she, industrious and wise,
Who with most skill the needful *Needle* plies,
For Eden vanish'd who Exhales no Sigh
When needles were not, or might useless lie,
Whose pliant Fingers and whose willing Heart
Less execute her Task than practice Art.

(From a "Sampler" made in 1790
by Anne Fraxham, aged eleven.)

Knotting and Splicing as a Manual Training Subject

J. L. Kerchen, Portland, Ore.

JUST how important a contribution knots, ropes and splices have made to the civilization of the race is problematical. Little is really known of their origin. Practically no written record of the art has been kept. Yet we know that primitive man tied, fastened and wove materials. Traces of this are found in the decorations of bygone peoples. The various American Indian tribes have shown remarkable proficiency in their knotting and splicing skill as shown in mats, baskets and boat building. Indeed, knotting must have played a prominent role with the thong-bound club, the bow and arrow, the tom tom and nearly all the crude instruments of savagery and barbarism.

Sorcerers, jugglers, witches, and conjurors have made much capital from knots in the plying of their trade. Even now frequently a street crier is seen who deftly ties around his neck a hangman's noose and then to the awe and wonder of the crowd, magically extracts his head from it. The story of Alexander and the Gordian knot adds testimony to the perfected knowledge of the craft even in his day.

In the evolution of rope work, unquestionably necessity has been the mother of invention. Each occupation and trade has developed the kind of knot that especially meets its own definite requirement. Hence we have weaver's, sailor's, fisherman's and hangman's knots. The different styles and variations are innumerable.

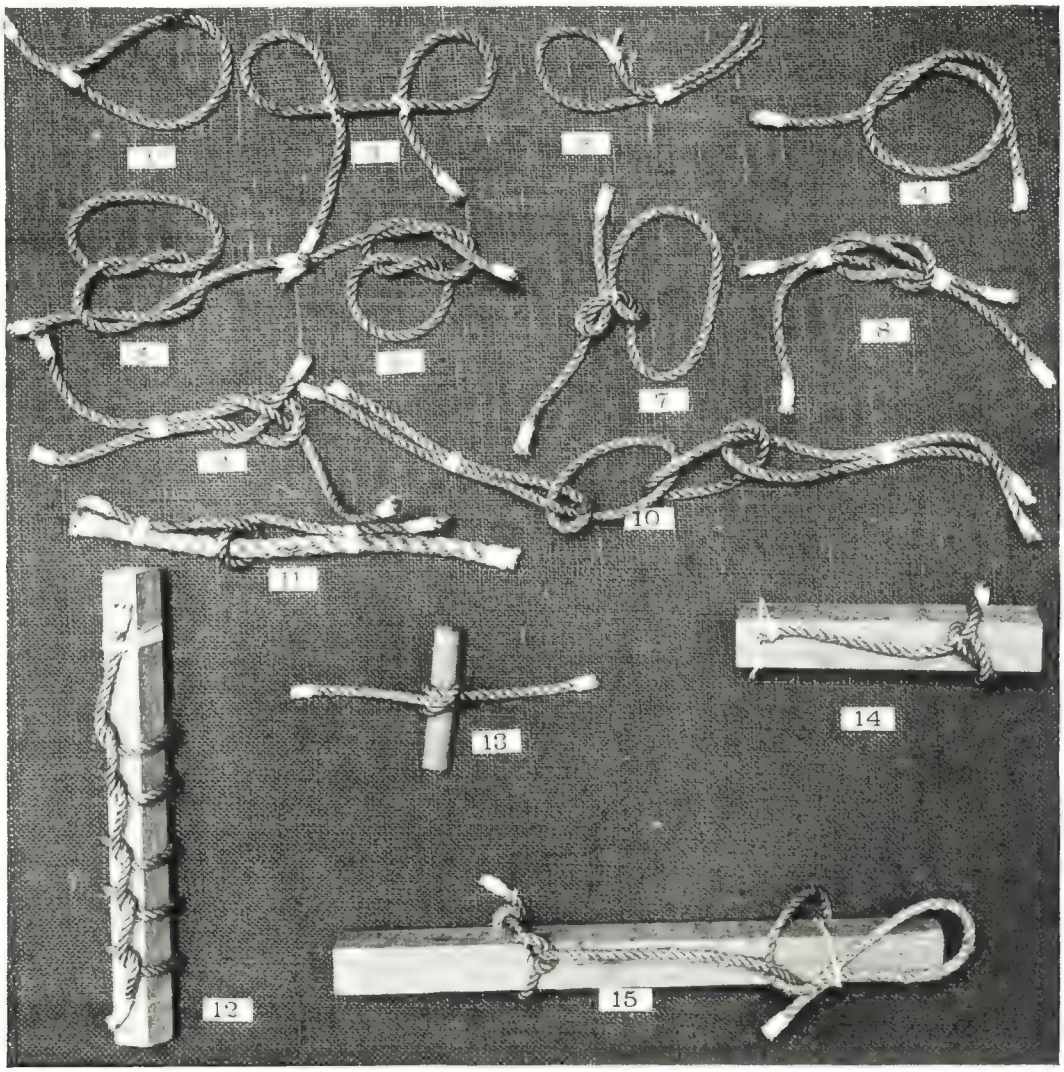


PLATE 1. SIMPLE KNOTS AND HITCHES.

But it is with a strictly utilitarian end in view that we consider the matter as a subject in shopwork. On numerous occasions a knowledge of this subject has been the means of preventing accidents and saving life. In making escapes from hotel fires or other places, a knowledge of knot tying may prove inestimable. In so many out-of-door activities, scouting, hunting, fishing, boating or what not, a knowledge of a goodly number of knots and splices adds much confidence and pleasure to the excursion.

As a manual training subject knotting and splicing has the following advantages to offer:

Interest.—No craft of which the writer is aware appeals more to the boy's natural interest than this work. The opportunity for good natured competition in being first to solve the problem; the chance to verify the conclusion, et al, develop an enthusiasm seldom equaled in other manual training subjects.

The Teaching Problem.—This work lends itself very easily to group or class instruction. To teach the subject well, provide each boy with a piece of rope four feet long. This can be tied and untied and used again for many knots. With a piece of the same kind of rope demonstrate to the whole class the method of tying the knot in question. From a single demonstration the majority of the class will succeed. Then require those who have been successful, to aid the slower members of the class. Constant repetition is necessary to fix the knots in mind. Frequent reviews should be given in the form of tests on a number of knots that have been previously done. This method satisfies all the requirements of classwork.

The Cost.—In these days when the cost of industrial education has to be apologized for, or explained to the uninitiated, rope work comes as a soothing balm. Two hundred lineal feet of ¼ inch manila rope for knotting and one hundred lineal feet of ¾ inch rope for splicing will suffice for an ordinary grammar school shop. From three to five dollars will cover the expense for one year depending upon local prices and upon the use of the same rope again and again for different knots.

Time.—In our city schools, Portland, Oregon, no regular time is set aside for this subject. A certain prescribed number of knots is done in each one of the four years of elementary shopwork. An excellent time to give the work is when the other work may have become too continuous or monotonous. It offers an excellent variation from the regular routine of the shop. One-half hour at any one time is sufficient for one recitation.

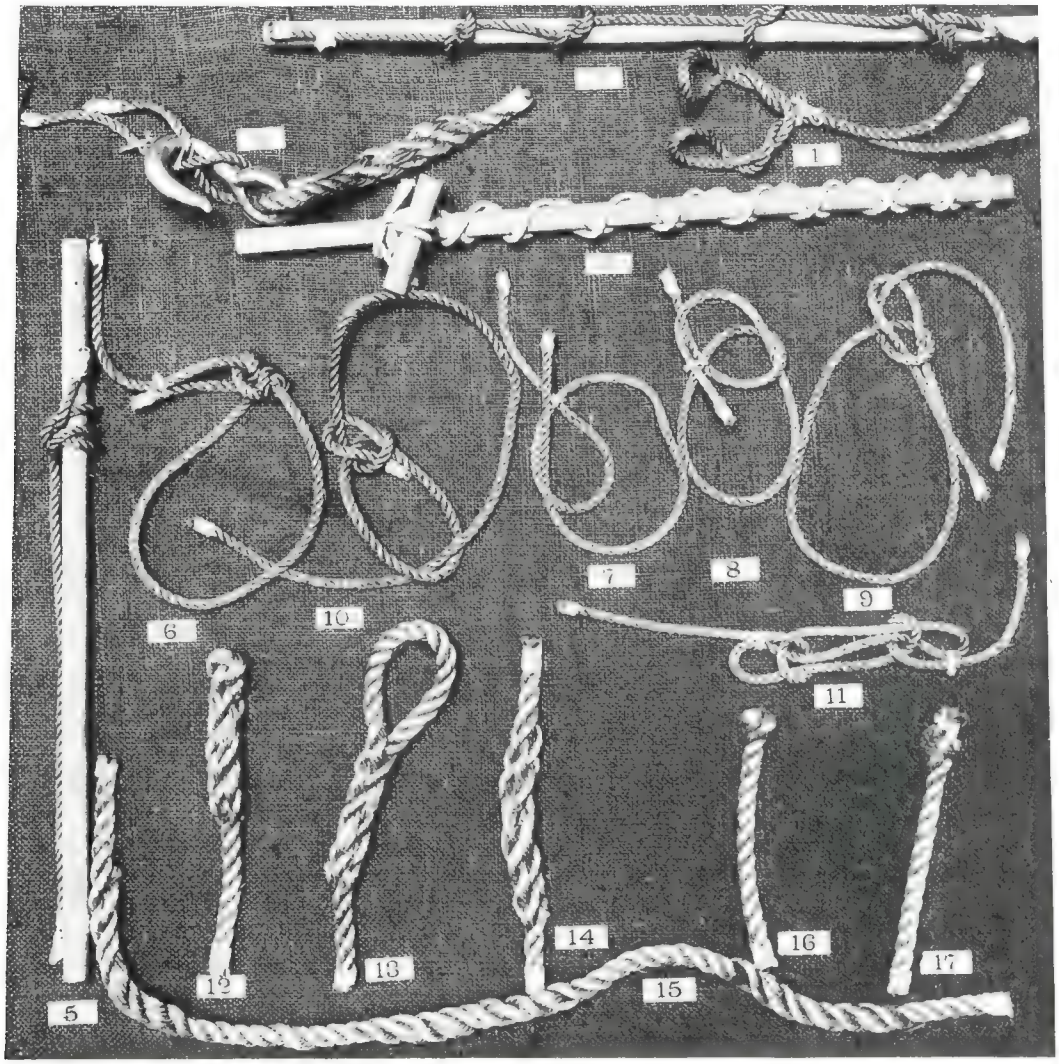


PLATE 2. HITCHES AND SPLICES.

The following shows by description and illustration the essential forms of knots covered in our course in knotting and splicing.

Cordage is a general term used to designate all forms of rope, string, cable, or twisted strand. The minutest element in a rope is the fibre of the material used. These twisted together form a yarn; two or more yarns a strand, and three or more strands a rope.

All knots are begun by forming a loop or what the

mariner calls "cuckold's neck" (Fig. 3, Plate 1). This gives rise to the parts of a rope used in knotting, namely, the *standing part,* which is the main portion of the rope, the *bight* which is the curve formed by the bend, and the end, which is the part used to form the knot (See Fig. 1, Plate 1). In classwork each boy should seize or "whip" the end of his rope. This is done to prevent unravelling. The method is shown in Fig. 2, Plate 1. Fig. 4, Plate 1 shows the simplest of all knots—the "Overhand." It is used in fastening ends, whipping, and in many places where other knots ought to be used. Fig. 5, Plate 1 shows the square knot. It is, perhaps, the most used of all knots. It is easily untied, strong, and never slips. Fig. 6, Plate 1 illustrates the "Granny knot." This is shown because of its confusion with the "square knot," from which it should be carefully distinguished. The reason why many women's shoes (and men's, too) are frequently untied is because "Grannies" are tied in place of square knots. The Granny is the most useless of all the knots. Fig 7, Plate 1 shows a square knot slipped. This is liable to occur when the rope is short or of unequal size. To remedy this, seize the ends as in Fig. 8, Plate 1. The "Weaver's knot" (Fig. 9, Plate 1) is one of the very best for tying small lines, threads, etc., is easily untied and like many knots, holds by the friction of the rope.

Figs. 10 and 11 of Plate 1 show the "Half-hitch" and seizing. This is an excellent method of fastening ropes together. It will admit of coiling and is easily handled.

The Double or additional half-hitches, Fig. 12, make a very secure fastening around a post or timber. This knot can be tied very rapidly and will stand almost any strain without slipping.

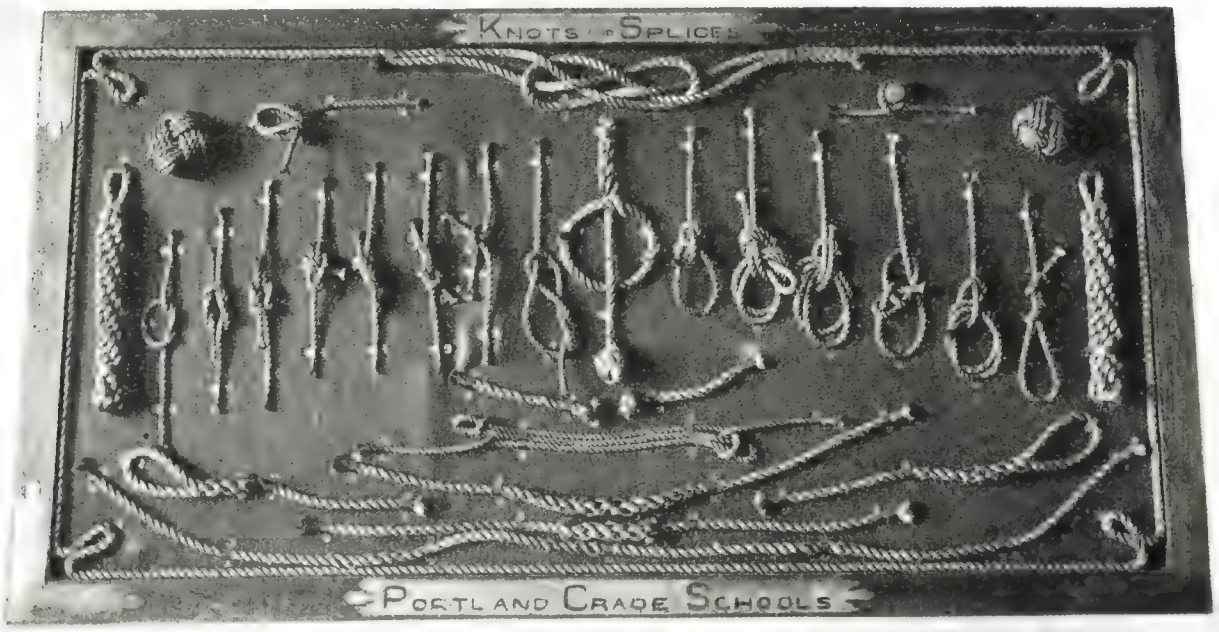
The Clove-hitch, Fig. 13, is one of the most secure of all the hitches. It is used by builders in hoisting timbers, and in fact any place where precaution must be taken against slippery, wet or smooth holdings.

The Timber-hitch, Fig. 14, offers a yet more secure fastening than the Clove-hitch. This is accomplished by twisting the rope three or four times around itself after passing around the rope or log.

In Fig. 15, Plate 1, a still better device is used to give added holding qualities. This is accomplished by adding another half hitch further along the spar.

The Catspaw hitch (Fig. 1, Plate 2) is one of the very best for a hook hoist. To make this hitch, pass the loop of your rope back of the standing part. Then twist each of the remaining two bights three turns in opposite direction; then place the two bights over the hook, as illustrated.

The Blackwall hitch (Fig. 2, Plate 2) is a very simple, yet secure method of hook fastening. Its method of tying is self-evident. It is another friction knot, and is much used in mule packing.



AN EXHIBIT OF KNOTS AND SPLICES MADE IN THE PORTLAND GRADE SCHOOLS.

The Chain hitch (Fig. 3, Plate 2) is used to fasten a line to a large rope to haul in for various purposes. It is simply a series of half-hitches taken around the object. It can be used with a handspike as in Fig. 4, Plate 2. It is also useful in roping trunks.

The Rolling hitch (Fig. 5, Plate 2) is a form of the Clove hitch. Its application is evident from the figure. It is especially useful in securing round objects on which the other knots may slip.

Midshipman's hitch (Fig. 6, Plate 2) is simply a half hitch around the standing part of the rope and two round turns above. It serves the same purpose as the rolling hitch, but is usually secured to a rope of its own size.

Figs. 7, 8 and 9, Plate 2, illustrate the bow-line knot. It is the genuine "Sailor's knot." It is useful around boats or anywhere, quickly untied and never

slips or foils. I think the figures illustrate it clearly. The student will find more difficulty in tying this than any other of the knots. But by noting carefully the three illustrations, no especial difficulty ought to be met.

The Running Bow-line (Fig. 10, Plate 2) is a regular bow-line, which forms a slip noose, and is tied in such a way that the end is not run thru the rope. It is useful where a part of a large coil is to be used.

There are many forms of Sheepshanks, that shown in Fig. 11, Plate 2, being the most common. These knots are used to take up slack in a rope when both ends are fast or when occasion demands.

Splicing is used in many cases where knotting would be impossible. It is always better looking than a knot, and where a rope must pass thru a block, splicing is absolutely necessary.

Fig. 12, Plate 2, shows the end splice. It should be taught first because it is less confusing; the material is all in one piece. It is used on the end of ropes to prevent unravelling. The next splice is the eye splice, Fig. 13. It forms a permanent loop on the end of the rope, and can be made of any size. Next in order is the short splice, Fig. 14; this is the most common and the most useful of all splices and is used to fasten two ropes together permanently.

Fig. 15, Plate 2, shows the long splice. This is more difficult to make. It is constructed by interlaying the separate strands. It is the only splice that will pass thru a pulley freely.

The Single Crown (Fig. 16, Plate 2) is an ornamental knot, and is used for forming a rope end.

The Wall knot (Fig. 17, Plate 2) is an adaptation of the Crown knot. Its main value is its use as rope ending with the ends tucked. These two knots may be combined to form a larger end.

I wish to express my appreciation of the book on "Knots, Splices and Rope Work," by A. H. Verrill. It is the very best of its kind and contains all the knots herein named, and many additional.

Also, to Messrs. H. J. Burrows, E. J. Burrows, and W. S. Hughes, of the Portland Manual Training department, whose practical experience and suggestions have helped make the work a success.

A CLASS IN KNOTTING AT THE HAWTHORNE SHOP.

THE PUBLIC SCHOOL PRINTSHOP

Karl H. Miller, Salina, Kansas

I AM certain that we realize that printing is justly one of the first three manual arts subjects and that a printing equipment has its place in the schools of today. School authorities are recognizing the fact and equipments for the work are being installed in a large number of schools. Printing in the public schools is not a fad but is here to stay. The main question with us now is: Who is to take charge of the printing department? As printing is a manual arts subject, the question of printing instruction is vital to the manual training teacher. This instruction will be given either by manual training teachers or by men selected from the printing shops. In any case the manual training teacher should be familiar enough with the work to act as a supervisor.

Superintendents are experiencing trouble in securing suitable men to take charge of the printing classes. A study of the situation shows that the printer with the general preparation and training expected of a teacher is worth far more in the printing trade, than the salary available as a member of a school faculty. A man with the education needed in the school shop is in such demand in high-class printing establishments that even the ordinary shop cannot afford to keep him. Then, again, the customers of the greater number of firms are not educated to first-class printing. Thus they do not demand first-class jobs and the general run of printers have had little experience in special layout work.

The attitude of the printing trade regarding their output is discussed in a recent issue of the house organ of The Western Type Foundry—"The Mutton-Nut." The article laments the low standard of work which the general run of houses were satisfied in producing.

Just the other day a printer spoke to me about the high school printshop stating that we taught the boys things that they must unlearn when working in their shop. When asked just what it was that the boy must unlearn he said, "The spending of so much time in spacing the lines on the cheaper jobs." The printer did not say that correct spacing was poor typography. He did say that the customer did not demand or pay for good typography so it was a waste of time for the boys to do careful, correct spacing. The larger the shop and the better the output, the more the specializing. That is, one man will be an expert type setter but know little of the other steps in the work. Men from these shops would have to pick up a good deal after taking the school position. In larger cities superintendents are able to offer large salaries and will be able to secure an all around printer, with a general education. The smaller places might be able to pay enough if they would keep the printer twelve months during the year; or, if the instructor could secure summer employment in a commercial shop. However, summer is the slack season for printing and it would be hard for an extra man to get work.

A professional printer, too, will find difficulty in fitting into the school system and looking at the subject from the schoolman's point of view. The average printer learns his certain part of the trade by imitating and acquires a speed that can seldom be equaled by the manual training teacher. The tendency of a practical printer will be to do a large amount of the work instead of throwing the responsibility upon the pupils. The trade journals are endeavoring to raise the standard of workmanship in all shops but we do not find many printers who take advantage of the discussions and articles in these magazines. They think that they are doing very well when they pick up kinks from the new workmen who are continually drifting in.

The manual training instructor has a good general education to start with. He also has the ability and the desire to advance by reading and using the statements made by authorities in any line he wishes to follow. With these qualities it will not be hard for him to pick up the work. I do not claim that all will be successful or that anyone will become an expert or an authority in this work. But I do claim that they can, and will, teach printing correctly and well as far as they attempt the work and that they will handle the subject in an educational way. I am sure that the schoolman can give decidedly satisfactory results if given charge of a printing class.

By this discussion I do not mean to give the impression that I think a printer will be a failure when placed in a school shop, but I do say that the superintendent should not overlook the man already on the school payroll in the search for a printing instructor. Nor should manual training instructors endeavor to block any movement which will give their school a printing equipment. What if you do not know about the work? As stated before, "A teacher will find little enough instruction to start him as a successful supervisor of such work." To conclude then, in the average case, it is better for the manual training teacher to teach the work.

I wish to add, at this point, that the commercial printers of Salina have always been a great help in the success of our high school shop. They have always had a kindly interest in our work and have given us many helpful suggestions. One reason for this interest may be explained by the statement of one of the printers, "The school printing departments will be a force in raising the standard of printing products and will create a national demand for better printing."

We keep a simple cost system in the shop so that we have the actual figures to back the following statements: During the first five weeks of this term the printing shop turned out one hundred and seventy-five dollars' worth of business. This amount includes $73 for stock. The $103 is the amount saved the school board in five weeks. These figures do not include the printing of "The Habit." Estimates from two commercial shops place the

value of producing 800 copies of "The Habit" at $100. A printing department is worth while if only as a financial investment.

Great care should be exercised in the purchase of materials for any printshop and especially for a school shop. The type foundries have lists of equipments which serve very well but when a person is buying, I would suggest that these lists be checked over by both commercial printers and by men who have had experience in school printing. An expensive equipment is not necessary to begin with, as much can be accomplished with a $200 equipment.

It might be of interest to know how copy is handled in our shop. All copy comes to my desk. We have an envelope upon which I place the following information: Job No., date received, received from whom, by whom, when wanted, No. of copies, description, color of ink, stock, size, when cut, etc. The copy and layout are placed in the envelope, and as the work is being carried on the pupils note the time spent on each job. The information added in the shop is the cost of stock, setting, composition, presswork, binding, etc. The proof and sample of the completed job are placed in the envelope with the copy and layout. This makes a complete record of each job and gives the boys experience with a simple cost system.

Quoting from a printing authority, who is a member of a large firm in New York City: "On the very first day of his actual apprenticeship he should be permitted to learn the case." You will find different methods in use for the teaching of the case. In one shop you will find the boxes marked (this has been hard to stop in our own shop). In another the pupil will be asked to draw the case and place the letters. The best method I have seen is described in the article "Teaching the Printers' Lower Case," by S. J. Vaughn. This paper was published in the February, 1914, issue of the INDUSTRIAL-ARTS MAGAZINE. Mr. Vaughn states, "Each boy has a case before him. I tell the lads that as there are three letter groups of letters which I want learned—first, a r, i s, j k, these groups are learned first because they are not consecutive and do not readily fall into the grouping which is to follow." Mr. Vaughn would have you teach all the letters of the case, using different groups. I have found his method very successful and recommend it. When familiar with the position of the letters, quads, etc., the pupil should be told how to hold the stick, how to pick up the letters. He should be warned against attempting to secure speed in setting because false motions will be acquired. The extra motions will stay with the boy unless time and effort is expended to overcome the faults.

The pupil should be able to come in contact with the best authorities thru the trade journals and books on the subject of printing. At Salina, we are using Vaughn's "Printing" and McClellan's "Practical Typography" as texts. The reference books on hand are: Thomas's "American Manual of Presswork" and "Platen Presswork"; Gress's "The Art and Practice of Typography"; Sherman's "Practical Printing." We are regular subscribers to "The Inland Printer," "Ben Franklin Monthly" and "Printers' Ink."

Fig. 217. Carved and Accented Border, with use of triple carved Band Motive. Courtesy, Berkey and Gay. (See page 71.)

INDUSTRIAL ARTS DESIGN

William H. Varnum, University of Wisconsin

(Eighth Article)

SURFACE ENRICHMENT OF SMALL PRIMARY MASSES IN WOOD.

WITH the present article we are entering into the consideration of the third and last major division of Industrial Arts Design, the subject of Surface Enrichment.

Nature and Need of Surface Enrichment. We have already treated in previous articles the subject of contour or outline enrichment. Now consider for a moment the fact that articles such as a square box, or tile, are not suited to outline enrichment yet have large, flat and rather monotonous surfaces capable of decoration. It is readily seen that such surfaces will admit of further elaboration which we will distinguish from contour enrichment by using the term "Surface Enrichment." As in contour enrichment, surface design not only increases the beauty of the object but it likewise, if properly applied, gives apparent added strength to the structure.

When and Where to Enrich. Strictly utilitarian articles should not be ornamented by surface enrichment. As an example, a wooden mixing spoon, bowl or wooden knife handle should not be enriched by carving as the carving would interfere with the proper cleansing of the article. A surface exposed to considerable wear should not be enriched. A paper knife, book stall, envelope holder or library table may be appropriately enriched in an unostentatious manner so that it will harmonize with its surroundings. But the enrichment should first be placed upon the surface in such a manner that it will not interfere with the functional use of the article for service. Large protuberances upon the back of a chair or upon the handle of a paper cutter are unpleasant and interfere with their intended uses.

The second point to be considered is the often-mentioned law that the surface enrichment must be thoroly related to the structure and the contour but not to obscure either. We must keep in mind the fact that it is necessary to support the structure, not cover it up by related ornament (Figure 191a).

Conservative Use of Ornament. Most critics of Industrial Design complain of an overwhelming desire upon the part of the designer to overdecorate the structure. Surface enrichment runs wild over steam radiators, stoves and wooden rocking chairs. Reserve is the watchword recommended as of extreme importance. The illustrations in this article are restricted to a limited range of design motives for the express purpose of simplifying the number of recommended methods.

Relation of Enrichment to Material. The close fibered woods with smooth, even textures are capable of more delicate enrichment than woods of coarser grain. Small articles are generally seen from a close range and should therefore, be also ornamented with finer decoration than a piece of furniture that is to be seen from a distant point. Furthermore the enrichment should not have a "stuck on" appearance but be an integral part of the original mass.

Appropriate Methods of Surface Enrichment for Wood. There are three distinct types or methods of ornamentation for wood: (1) inlaying, depending for interest upon the difference in value and hue of the different woods used; (2) carved enrichment depending upon line and mass for its beauty and made visible by contrasts of light and shade; (3) painting or staining of the surface with the interest dependent upon the colors or stains and their relation to each other and to the hue of the wood. It has been deemed wise to consider the first two types in the present article, and leave the last for later consideration.

Inlaying. Treating these methods in their order we find that inlaying is one of the most common and best forms of enrichment and lends itself to many manual arts exercises. As inlaying readily adjusts itself to bands and borders, the emphasis has been placed upon them in the present article.

Two conspicuous errors are often associated with inlaid designs. The first is the use of woods affording a glaring contrast with the parent block (Figure 209). The right contrast of value is established when the inlay seems neither to rise from the surface nor sink thru it. It should remain *on the surface* of the plane to be enriched, for it is surface enrichment. Figures 210, 211 and 212 are illustrative of pleasing contrasts.

The second specific glaring error is unrelated inlay. As an example, an Indian club is created by glueing many vari-colored woods around a central core. The result of the pattern so formed has little relation to the structural lines, fails entirely to support them and as a result, should be discarded.

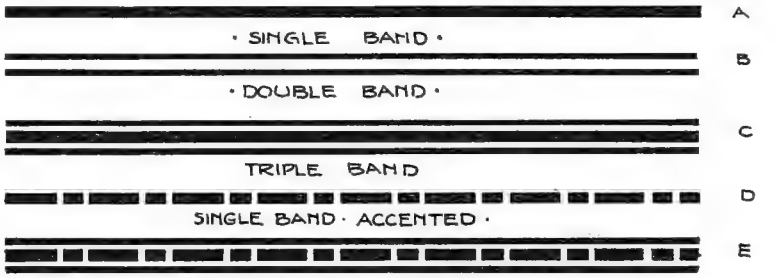
Carving. Carving is more difficult for the average beginner in woodworking design; therefore merely the simplest forms of the craft are suggested as advisable (Figure 205a). If an elaborate design is desired (Figure 205c), it should be first drawn in outline and finally modeled in relief by Plastelene. This model is then an effective guide for the carver, supplementing the original outline drawing.

Divisions of Carving. Carving may be roughly divided into the following groups: (1) high relief carving similar to heads, human figures and capitals; (2) low relief carving in which the planes have been flattened to a comparatively short distance above the original block of wood. Panels are good examples of this group; (3) pierced carving where the background has been entirely cut away in places. Screens illustrate this type; (4) incised carving in which the design has been depressed *below* the surface of the wood. Geometric chip carving is a representative type of this group. There are possible variations and interlacings of these groups, adapted to the skill of the designer.

STRAIGHT LINE
SURFACE ENRICHMENT OF A SMALL PRIMARY MASS IN WOOD

BANDS AND BORDERS
FOR INLAYING · CARVING · STAINING

· A GROUP OF BANDS WITH HORIZONTAL OR "ONWARD" RHYTHMIC MOVEMENT ·



· TRIPLE BAND · ACCENTED ·
FIG · 192 ·

· BORDERS ·

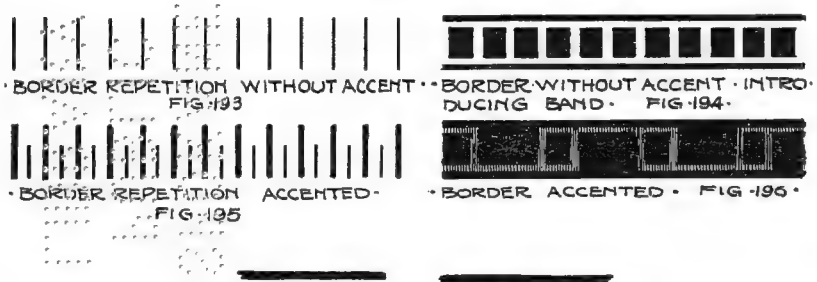


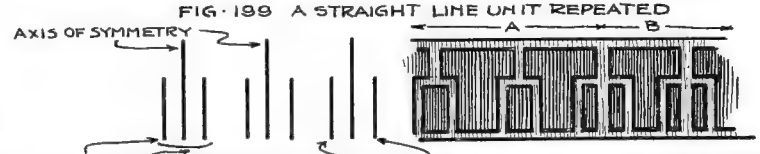
FIG · 197 ACCENTED BORDERS (GREEK)

FIG · 198 ACCENTED AND BALANCED BORDERS ·
(SARACENIC)

Plate 28.

SURFACE ENRICHMENT OF SMALL PRIMARY MASSES IN WOOD WITH
BORDERS OF CURVED AND STRAIGHT LINES ·
FOR INLAYING · CARVING STAINING · · · · · ·

FIG · 199 A STRAIGHT LINE UNIT REPEATED

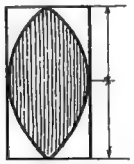


AN ACCENTED GROUPED AND BALANCED UNIT WITH TWO FORMS OF ENRICHED APPLICATIONS TO IN LAY

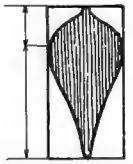
FIG · 200 THE LEADING LINES OR SKELETON OF A CARVED BORDER

THE QUALITIES OF INTERESTING FORMS FOR CLOTHING LEADING LINES OF A BORDER

A FORM WITHOUT INTEREST
FIG · 201



A MONOTONOUS FORM
FIG · 202



A DYNAMIC FORM WITH RHYTHM
FIG · 203

STRONG DYNAMIC FORMS WITH A COMMON RHYTHMIC MOVEMENT
FIG · 204

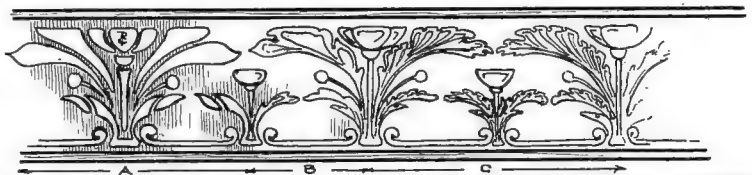


FIG · 205 · THE LEADING LINES OF FIG · 200 ARE ENRICHED OR CLOTHED BY INTERESTING FORMS SUGGESTED BY NATURAL MOTIVES THE MOVEMENT IS UPWARD AND ONWARD

FIG 206 TWO VARIATIONS OF A CARVED DESIGN WITH A STRONG ONWARD FEELING

Plate 29.

The central governing technical thought in all carved designs is to show an interesting proportion of light and shade coupled with a unity between the carved portion of the design and the background. If the carving has a glued on appearance it becomes mechanical and reminiscent of stamped or machine-produced ornament.

A typical carved enrichment is carried thru four processes: (1) The design is tranferred to the wood surface by means of carbon paper; (2) The design is "set in" or separated from the ground by means of a grooved chisel; (3) The wood is cut away from the back of the design by a process of grounding; (4) The leaves and flowers or other elements of the design are modeled. The designer should keep these processes in mind when assembling his design.

The Designer's Vocabulary.

It is now essential to find the extent of the vocabulary possible for the designer of surface enrichment. He has three large sources of information: First, geometric forms and abstract spots; second, natural organic objects such as flowers, leaves, animals, etc.; third, artificial objects, pots, jars, ink bottles and other similar objects.

He may assemble, or group, these objects or elements for future designs into four typical systems, bands or borders, panels, free ornament and the diaper or all-over patterns. The first system will be considered in the present article.

Designing Bands and Borders.

Bands. Bands are directly suited to inlaying processes and may be composed of straight lines arranged in some orderly and structurally related manner. Bands are for bordering, framing, enclosing or connecting. That demands a decided horizontal or *onward* motion which tend to increase the apparent length of the surface to which it is applied. Referring to Plate 28, Fig. 192, we find three typical bands, A, B and C. It is often the custom to limit the width of the inlayed bands to the width of the circular saw cut. To secure unity, the center band in C is wider than the outside sections.

Accenting. A possible variation of motive in band designing may be secured by accenting. The single band has been broken up at D into geometric sections of pleasing length. But while this design gives variety, it also destroys the unity of a single straight line. Unity may, however, be restored by the addition of the top and bottom bands at E. This method of restoring unity is of extreme value in all border arrangements and is constantly brought into play by the designer.

Borders. Bands, as has just been stated, have distinctly "onward" movement. Borders are merely bands combined with other motives from the designer's vocabulary. As will be seen, bands, by their onward movement, tend to hold the other elements of the border together. Figure 193 is a border design without variety, unity or interest. Figure 194 has added unity to this border by the addition of the double bands, but monotony is still present. Figure 195 suggests a method of relieving the monotony by accentuating every other repeat, thus supplying variety and creating analogy to march time music. Figure 196 has accentuated the monotonous border in Figure 194 by omitting every other square. This makes a simple and effective inlay pattern and suggests a large number of possible variations that could be applied to accented band motives.

Fig. 191a. Structure Obscured by Surface and Contour Enrichment.

Figures 197 and 198 are border motives of geometric derivation taken from the historic schools of ornament. Figure 198 illustrates the "strap ornament" of the Moorish school. The simple underlying geometric net upon which these designs are based may be found in Meyer's Handbook of Ornament.

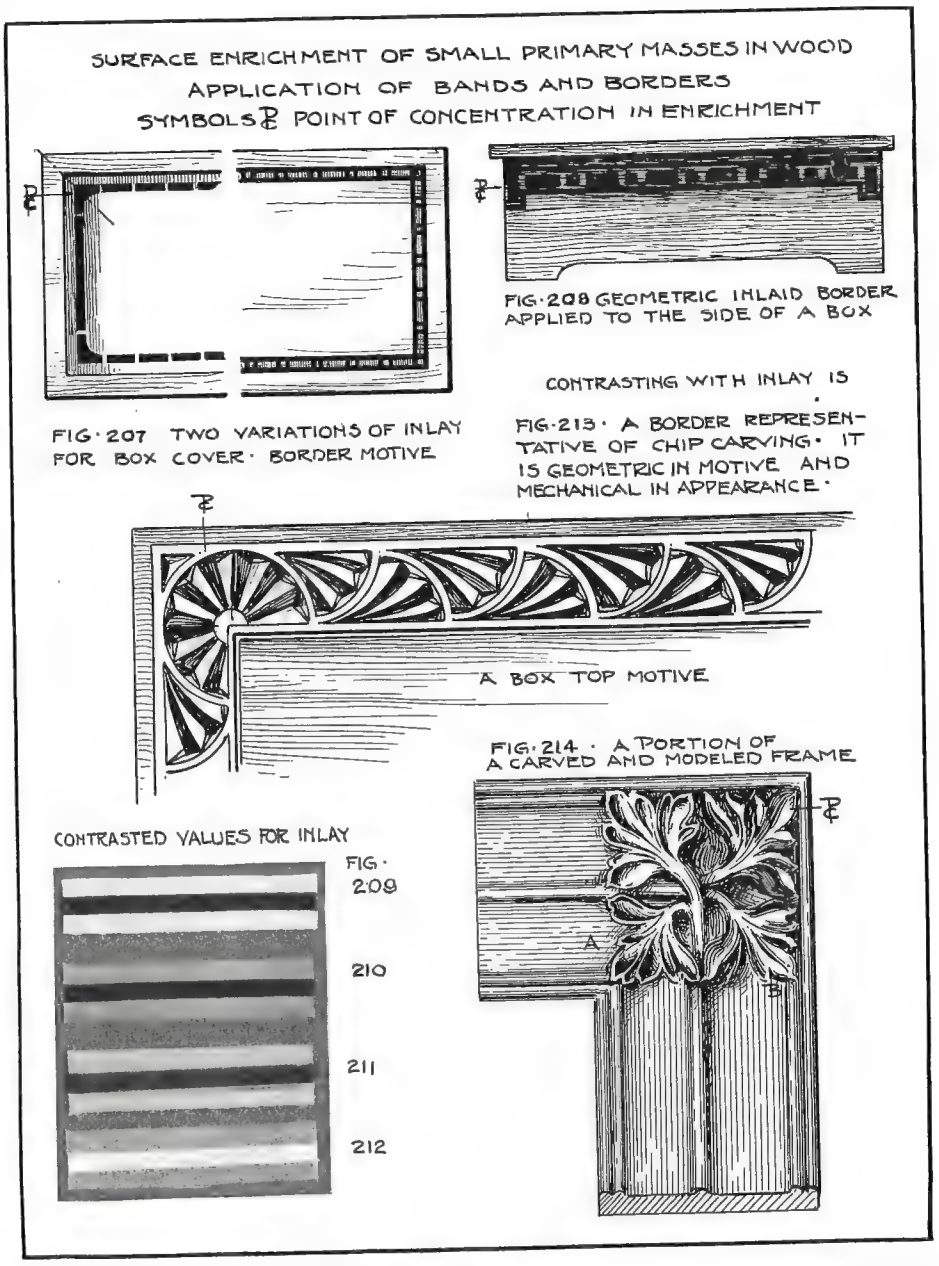
Upward and Onward Borders. In addition to the purely onward borders we now come to a variety with a distinctly "upward" movement as well. While, however, adding materially to the interest of the border, it also adds to the difficulty of designing. The upward movement is often centered about an axis termed the Axis of Symmetry about which are grouped and balanced the different elements from the designer's vocabulary. When both sides are alike, the unit so formed is called a bi-lateral unit. Figure 199 shows the formation of a bi-lateral unit by grouping, accenting and balancing of straight lines over an axis of symmetry. By adding bands above and below and doubling these vertical lines to gain width, we have quickly formed at A and B (Figure 199), inlaid designs with an upward and onward tendency or movement.

Curved Leading Lines for Carving. The introduction of curved lines and natural units allows us to add more grace to these combined movements. The leading lines of a small border designed to be seen at close range are planned in Figure 200. The central line or axis of symmetry (A. S.) is repeated at regular intervals and

the leading or skeleton lines are balanced to the right and left of this axis. These leading lines, as can be readily seen, have an upward and onward movement and to insure continuity a small link and the top and bottom bands have been added to complete the onward movement.

Material for Clothing the Leading Lines. This material may be derived from geometry, nature or artificial forms, but for carving curved line borders, nature is generally selected as fitting and appropriate.

Figure 201 illustrates a crude and uninteresting form, unsuited to outline enrichment. Figure 202 has brought 201 into some semblance of order, but as can be readily seen by the primary outline which encloses it, the widest point which occurs exactly midway from top to bottom, makes the form monotonous. This defect has been remedied in Figure 203 and an interesting and varied area appears for the first time. What Dr. Haney calls "the feebly flapping curve" of 202 has been replaced by the vigorous and "snappy" curve of 203, forming what is termed a dynamic or rhythmic form of value in surface enrichment.



Dynamic Forms. Any form which causes the eye to move in a given direction is strongly *dynamic,* and is opposed to the static form which does not cause a marked eye movement. A circle is symbolic of the static form while a triangle is dynamic. In the designer's nomenclature, the term "rhythmic" may be used synonymously with dynamic.

Dynamic Areas or Forms should carry out the upward and onward movement of the leading lines. Figure 204 shows how closely dynamic areas are connected with nature's units for design motives. A slight change in the contour may transform a leaf into excellent material with which to clothe the leading lines. The curve of force, the cyma and other curves described in previous articles should be recognized by the designer and utilized in the contours of dynamic forms.

Enriching the Leading Lines. The leading lines of the border in Figure 200 are shown clothed or enriched in Figure 205. Vigorous dynamic spots conventionalized from natural units continue the upward and onward movement of the original leading lines. As will be noted, the background has been repressed to allow the spots to appear in relief. Small "fussy" spots or areas have been omitted and the units, varied in size and strongly dynamic in form, balance over a central axis of symmetry. The small link, reaches out its helping hand to complete the onward movement without loss of unity, while the bands above and below, bind the design together and assist in the lateral movement. Figure 205 shows three methods of treatment; simple spots without modeling from A to B; slight indications of modeling from B to C; full modelling of the entire unit at C. The choice of treatment depends, of course, upon the skill of the craftsman.

Figure 206 shows a design varied from formal balance over a central axis of symmetry. It has a decided onward movement with the leaves balanced above and below the stem which is the axis. The "repeat" has been reversed at B and is more pleasing than the portion at

A. The area of the background to the amount of ornamentation or "filling" cannot be predetermined with exactness. There should be no blank spaces for the eye to bridge. Some designers allow about one-third ground for two-thirds filling or enrichment. This proportion gives a full and rich effect and may be adopted in most instances as satisfactory.

Point of Concentration. When a border is used to parallel a rectangle it is customary to strengthen the border at the corners for two reasons: First, to apparently strengthen the structure at this point; second, to assist the eye in making the sudden turn. It, likewise, affords momentary resting point for the eye, adding pleasing variety to the long line of the border. This strengthened point is called the *point of concentration* or point of force. Its presence and effect may be noted at the Symbol P. C. in Figures 207, 208, 213 and 214.

Figure 213 represents the rather angular and monotonous chip carving motive. It is, however, a simple form of carved enrichment for thin wood construction. Figure 214 shows the more rhythmic flow of a carved and modeled enrichment. Two methods of leaf treatment are given at A and B.

Figures 215, 216 and 217 are industrial examples of the forms of surface enrichment treated in this article.

Rules for Surface Enrichment of Wood.

6a. Surfaces to be enriched must admit of enrichment.

6b. Surface enrichment must be related to the structural contours but must not obscure the actual structure.

6c. The treatment must be appropriate to the material. The finer textured woods should be enriched by more delicate ornament than the woods of coarser fibre.

6d. Bands and borders should have a consistent lateral, i. e., onward, movement.

6e. Bands and borders should never have a prominent contrary motion, opposed to the main forward movement.

6f. All component parts of a border should move in unison with the main movement of the border.

6g. Each component part of a border should be strongly dynamic and if possible, partake of the main movements of the border.

6h. Borders intended for vertical surfaces may have a strongly upward movement in addition to the lateral movement provided the lateral movement dominates.

6i. Inlayed enrichment should never form strong or glaring contrasts with the parent surface.

6j. Carved surface enrichment should have the appearance of belonging to the parent mass.

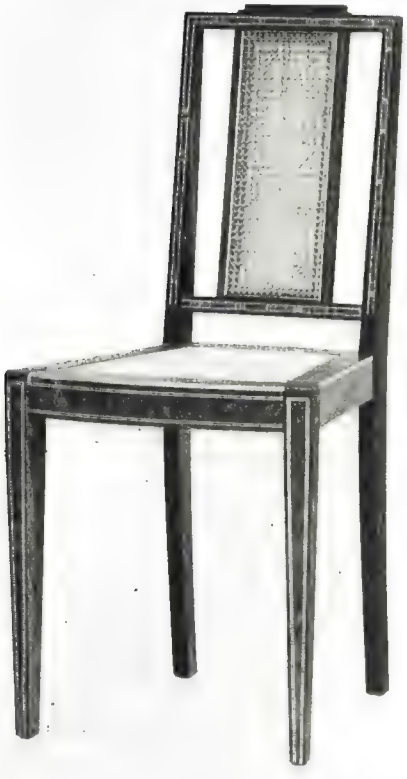


Fig. 215. Inlaid Band Border Courtesy, Berkey and Gay.

Fig. 216. Single and Double Band Inlaid Border. Courtesy, Berkey and Gay.

WOOD TURNING PROJECTS

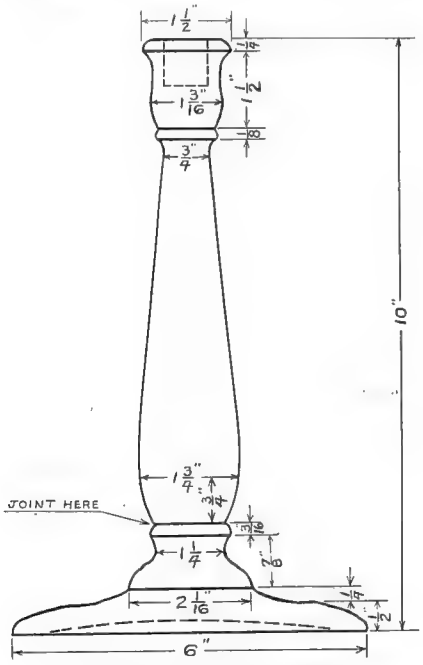
G. C. Polson, Indianapolis, Ind.

COVERED BOXES.

THE entire box can be made from one piece of stock. The stock must be thoroly dry, and can be in one piece or glued up. Mahogany, walnut, cherry, and maple work up nicely. The stock for the accompanying drawings should be approximately one inch larger in diameter than the finished project. The length of the stock is the height plus the waste, which includes the cutting off of the cover and the cutting of the base of the box from the face-plate.

II. Mounting the Work.

The stock should be square and have one end squared to the faces. On the opposite end draw the largest circle the stock will permit. The corners can be removed with the band saw, draw knife, or between the centers in the lathe at *low speed*. Fasten a face-plate to the squared



Working Drawing for Candle Stick.

end of the stock (see face-plate). Turn the stock to a cylinder with the gauge, at *low speed*.

III. The Cover.

Altho some use the cutting tools for face-plate work, I always have the boys use the scraping tools; namely, diamond point for digging out; round nose for concave surfaces; square nose or flat skew for straight surfaces; flat skew for convex surfaces; and parting tool for cutting out work. Face off the end of the stock and turn the inside of the cover (see finish). Turn the outside of the cover to approximate size, and cut the cover from the stock.

IV. The Box.

Turn the inside of the box (see finish). Fit the cover to the box using the box as a chuck for the cover. Turn outside of both box and cover. Finish.

V. Cutting Stock from the Lathe.

Remove cover and fit it on loosely. Cut the work from the face-plate leaving bottom of box slightly concave. Felt may be used to cover bottom.

The Face-Plate.

The face-plate used to hold the stock for the accompanying drawings should be from 4 inches to 6 inches in diameter. Fasten it to the stock with from three to six No. 12, 1½ inch flat head screws.

In determining the length of the stock three things must be considered: (1) the cover, if there is to be one, and a little waste in cutting it from the stock; (2) the body of the box; (3) the waste in cutting the piece from the lathe. The cover may be made from a separate piece and have the grain of the wood running across the box instead of using the end grain. This, however, may warp and spoil the cover. The waste may include enough

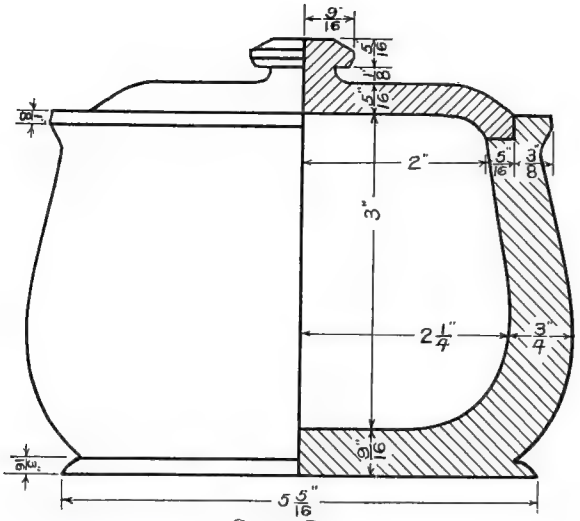
Turned Candle Sticks.

stock to cut the piece from the lathe clearing the screws, or to just cut down to the screws with the parting tool and bore away the rest of the waste with a Forstner bit. A little tallow or soap on the screws will help in driving them into the end grain. The face-plate should be screwed on the lathe very carefully, avoiding jamming it on too tight. A piece of bristol board used as a collar will prevent the face-plate from sticking. This will throw the work "off center" unless care is used in replacing it each time.

Lamp Standards.

The stock for the shaft should be ½ inch larger in diameter than the finished dimension, and ¾ inch longer than the over-all dimension of the lamp standard. The stock for the base should be ⅛ inch to ¼ inch thicker, and one inch larger in diameter than the finished dimensions.

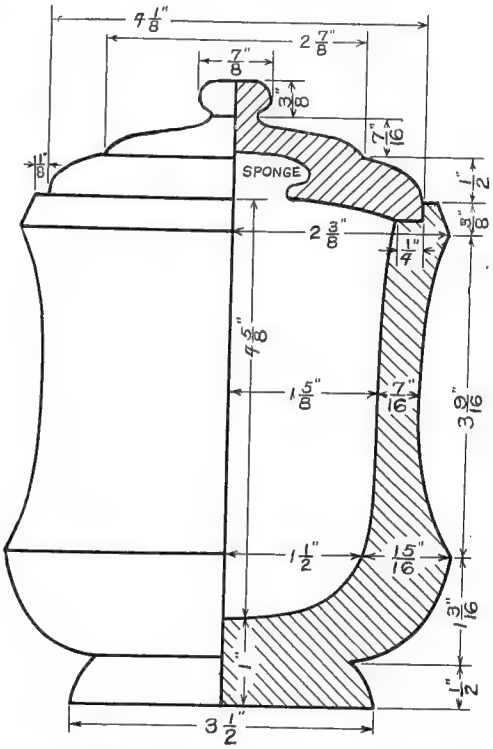
Surface one side of the base and remove corners with band saw. Bore a one inch hole thru the base at right angles to the surfaced side. Turn the shaft to a cylinder. Turn a tenon on the live center end of the shaft. The tenon should be one inch in diameter and ½ inch shorter than the finished thickness of the base, and have a square shoulder. Assemble the base and



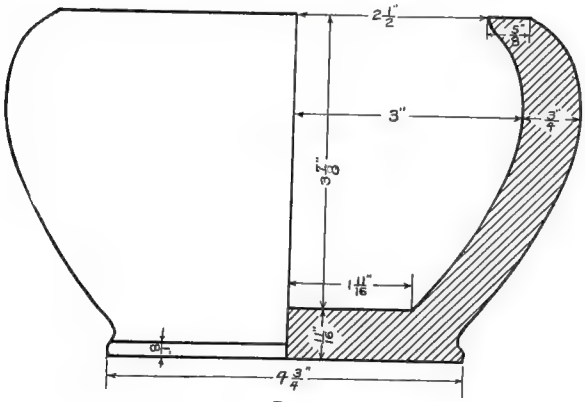
Covered Box.

Tobacco Jar. (Drawing below)

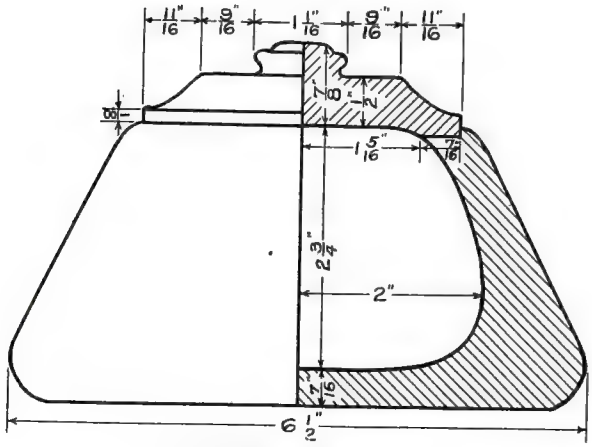
Types of Covered Boxes.



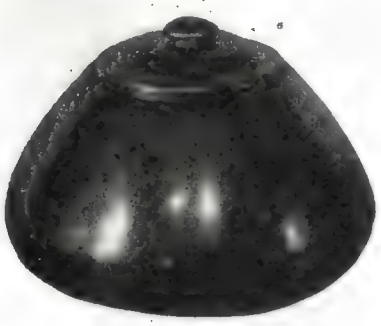
Working Drawing for Tobacco Jar.



Box.



Working Drawing for Covered Box.



Covered Box. (Drawing at left.)

shaft. When they fit perfectly, clamped, glue up and let stand over night.

Replace the work in the lathe and turn as other work, using the scraping tools on the base and the cutting tools on the shaft. Block out the base, then turn it to approximate size. Next, turn the shaft. See finish.

Bore a hole for the pipe or cord. This may be done before the standard is turned, but with large standards there is little danger of their splitting. A shade can be made or purchased. There are various ways of supporting the shade. One way is to use wire or strips of metal fastened either beneath or around the socket. These supports run to the rim or the inside of the shade. The socket should be supported by a piece of pipe which extends into the shaft from four inches to eight inches. A rubber bushing should be used where the cord comes out of the base. The lamp may be weighted by means of lead or iron plates fastened to the underside of the base, if one so desires.

Candle-Sticks.

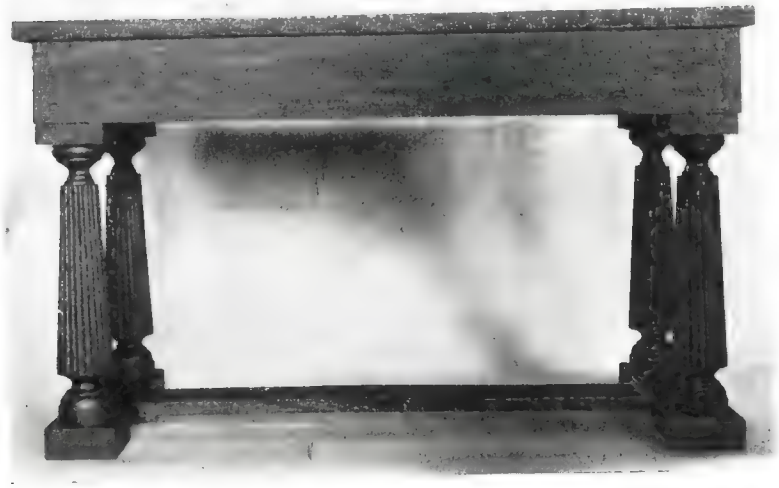
About all the instructions necessary for the candlestick will be found in the first three paragraphs on "Lamp Standards." The hole to receive the candle can be bored either before or after the stick is finished.

Finish for Wood-Turning Work.

I. Preparing the Wood.

Often times the finer lines of turned work are spoiled by the careless use of sandpaper. Sharp tools held in the proper way will necessitate very little sandpaper. The few rings that may be cut in the wood can be removed by raising the grain with water and sanding with the grain while the piece is not in motion.

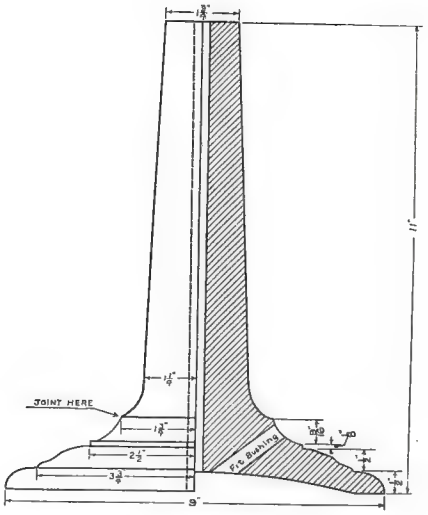
LIBRARY TABLE.
Made of American Black Walnut in the Author's Class.



PIANO BENCH MADE IN THE AUTHOR'S CLASS.
Quarter sawed oak; stained, ready for filler and finishing coats.

II. Applying the Finish.

The finish on turned work in the school shop is perhaps more slighted than the finish on any other piece of work. A good piece of work is often discarded because it has lost its finish. In fact, it never had one to loose; possibly a coat or two of oil or shellac, or a little of both,



Lamp Standard.

Candle Sticks.

daubed on from a pad while the work was in motion, giving the zebra effect. The pad is all right if it is used in the proper way for French Polishing.

One of the best places to teach careful rubbing is on turned work. However, the work does not necessarily have to be in motion. A good finish and one that will stand up may be obtained in the following manner: If the work is stained, allow 24 hours for the stain to dry. If a paste filler is to be used, a coat of thin shellac should follow the stain to keep the filler from loosening the stain. Burlap seems to be the best for rubbing off the surplus filler. Waste or rags are so fine that they go down into the pores and wipe out the filler. Excelsior should *never* be used. After the filler stands 24 to 48 hours, apply a coat of thin shellac. The next day rub it down with fine sandpaper. After from three to six thin coats of shellac have been applied, rubbing each coat, there should be no shiney spots in the finish. Another coat of shellac, rubbed, will give a fairly good finish. The last coat should be rubbed with pumice stone and oil for a gloss, and pumice stone and water for a dull finish. Rotten stone will give a finer finish still.

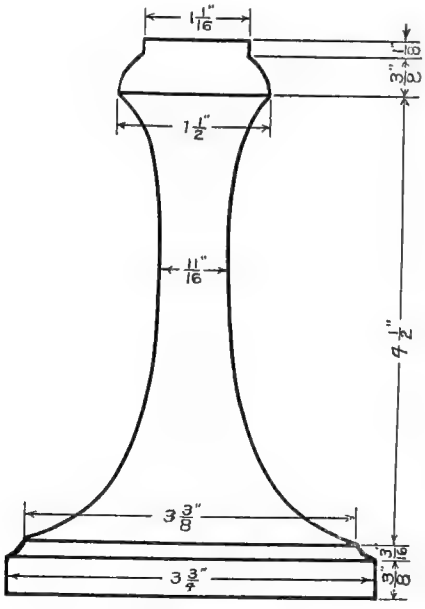
A better finish can be secured in the following manner: Two or three coats of varnish after the first coat of shellac. Thirty-six to 48 hours should be allowed between coats.

Note:

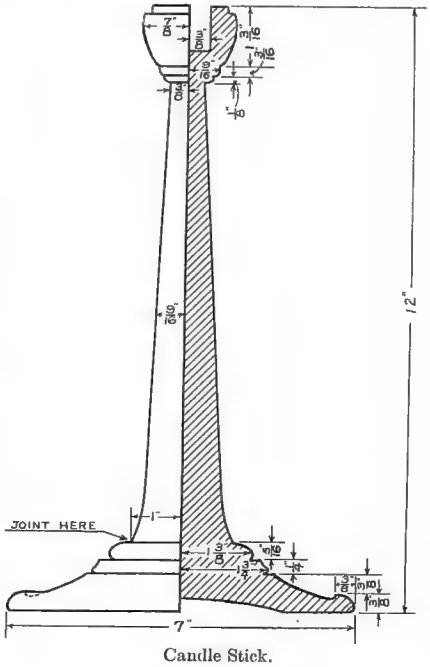
In finishing the inside of box covers cut the cover loose and finish by hand while the inside of the box is being turned. The inside of the box can be finished by hand, also after the work has been cut from the lathe, if one so desires.

Some prefer to finish the lamp standards after the hole for the pipe has been bored. If one is at all careful the finish will not be damaged in boring the hole.

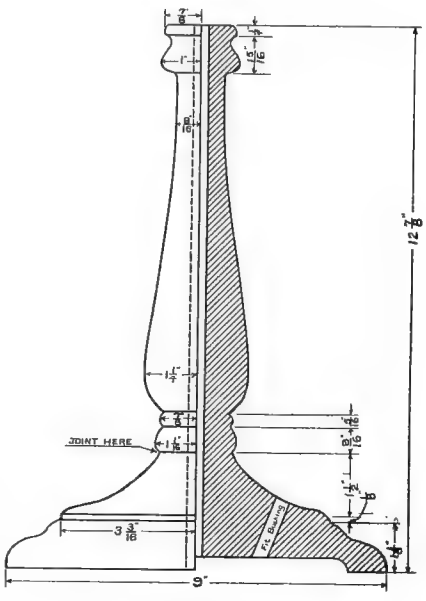
The turnings on pieces of furniture and the like should be assembled with the rest of the piece, and then finished after the same fashion as the rest of the piece.



Candle Stick.



Candle Stick.



Lamp Standard.

Construction Work in the Lower Grades

Fred L. Curran, Instructor in Primary Handwork, Stout Institute, Menomonie, Wis.

BASKETRY.

BASKETRY as a form of handwork in the public schools consists of various types of construction and brings in the use of reeds, raffia, ash splints, sweet grass, straw, corn husks, and other materials. While some of the simpler problems using raffia or grasses may be made by children in the first and second grades, it is usually thought best not to attempt much work in basketry until the third grade or later.

The purposes of this article are to make clear to the beginner the various steps involved in the making of common reed baskets and to suggest a few things which may be of help and interest to the grade teacher in handling this subject. After making a few baskets of the simpler kinds one can easily learn how others are made. The odd and fancy shapes are omitted here and are not recommended for regular public school work. In the making of baskets as in other work, we should keep in mind the fact that children need training in the appreciation of the beauty which may be produced in simple shapes and constructions. This matter of appreciation is usually of slow growth, and because of this, should be started in the early years and continued as long as possible.

One of the simplest problems in reed basket work is the round mat and this is a good piece of work to begin with in the third grade. A second mat may be made of larger size and with different border pattern, and then the children will be able to make a small basket. In the fourth grade a mat may first be made to review the work done in the third grade. Then the basket problems may be started. Two or more small baskets should be made by each pupil in order to develop some skill. It seems that a certain amount of skill must be developed before the children really like the basket work.

Reed and raffia may be obtained from almost any large school supply house. The unbleached raffia costs about 15c per lb. Reed is made in as many as eight sizes. The smallest (No. 1) costs about 95c per lb. and the coarsest (No. 8) costs about 45c per lb. For third grade work Nos. 1, 2 and 3 are usually used. Fourth-grade children can handle Nos. 2 and 4 quite well. Two sizes are always used—the small size for the "weaver" and the large size for the "spokes."

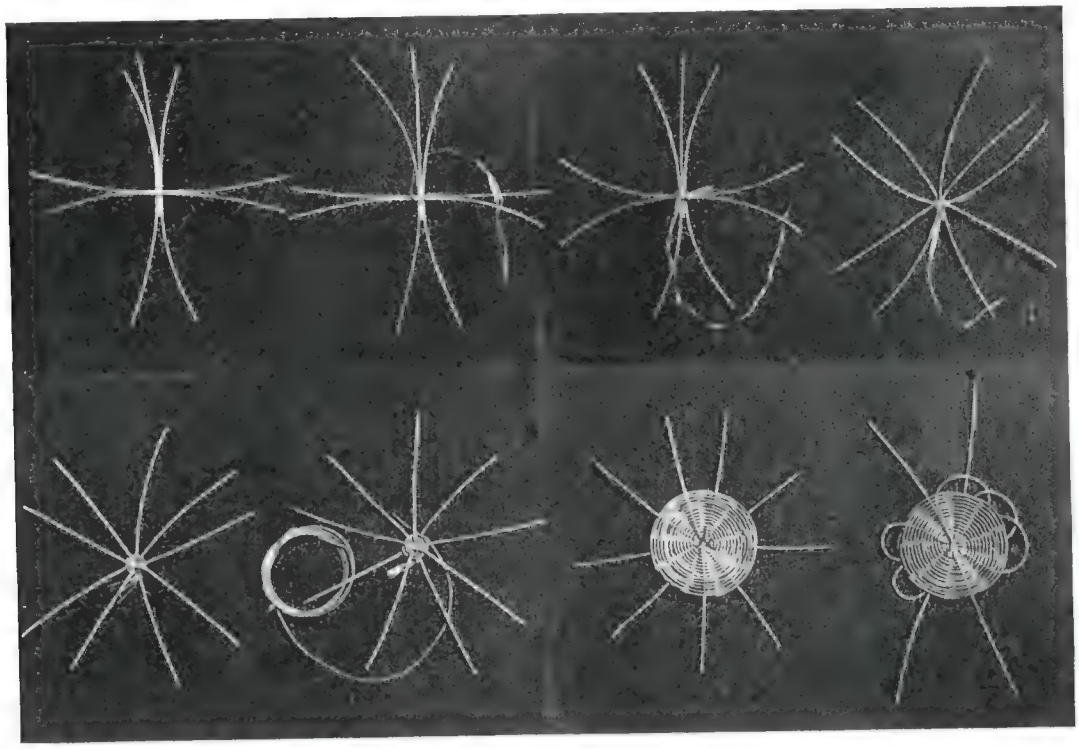


Fig. 1. STEPS IN MAKING REED MATS.

General Suggestions for Teaching Basketry.

The teacher should have at hand one or more containers, partly filled with water, in which to soak the reed. These should be at least eight or ten inches in diameter so the coils of reed may be put in and taken out with ease. Large pails, or stone jars, answer the purpose very nicely, while in some cases small galvanized wash tubs are used.

When the reed comes from the supply house it is tied in bundles or in coils with one, two, or three pounds in each. The first work for the teacher and children is to get this large package taken apart and put in such

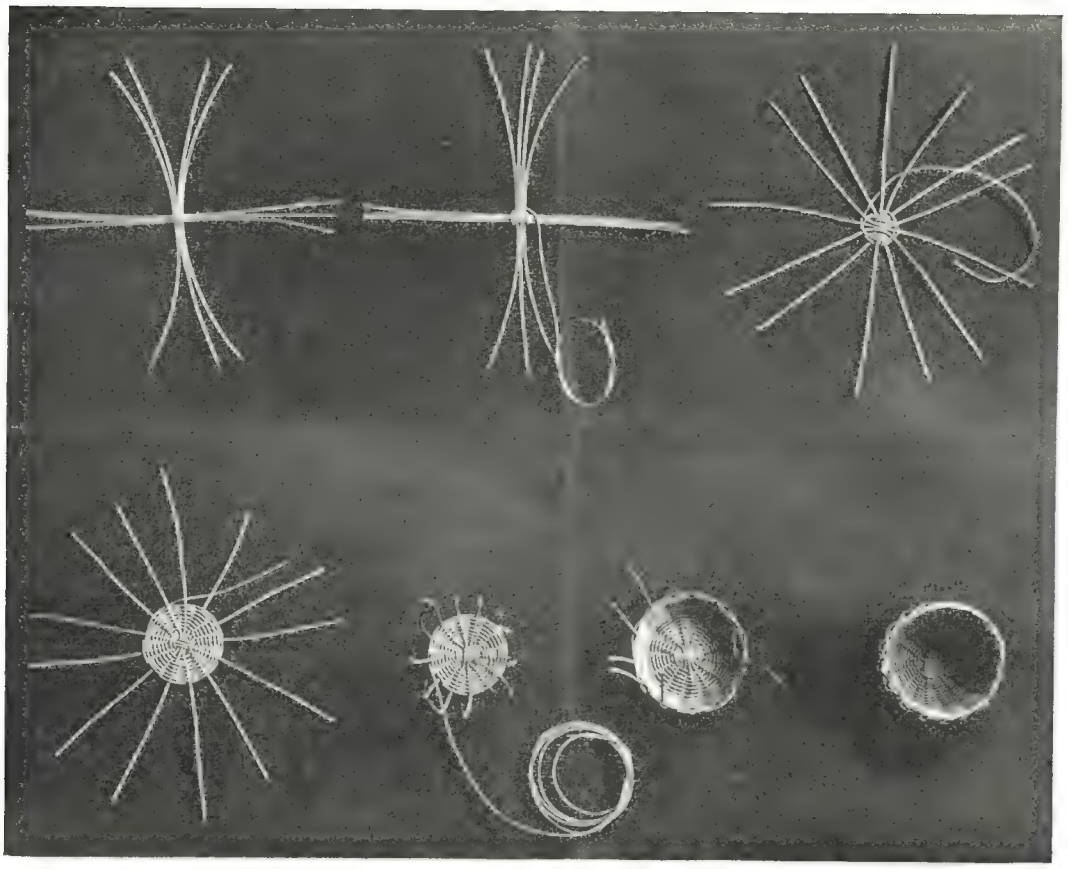


Fig. 2. STEPS IN MAKING REED BASKETS.

condition as can be used readily. It is thought best to dip the bundle in water just to dampen it, then proceed to have each pupil pull out one long reed and wind it into a small coil. The ends of this coil are fastened by intertwining in and out of the center. It is then laid away or put in water to soak. This work of winding into small coils is continued until all of the large coil or bundle is used up. If the small coils are properly fastened they will not easily come apart, and the reed will be in such shape that it can be used quickly and with but little waste from tangling. If left in the large coil and used from there by the children, it gets tangled and broken, and results in waste and confusion. While the reed is being pulled from the large bundle one person should hold the bundle in such a way that it will not tangle.

When the lesson is begun the children take the small coils and unwind one end for about two feet. The remainder of the coil is again fastened with the other end. This keeps the long reed off the floor and helps to keep it in a moist and pliable condition. If at any time the reed winder becomes dry and stiff it should be dipped in the water again for a few seconds. Unless the winder is pliable the children will not be able to get results in the starting of the work.

In presenting the work to a large class it is usually necessary to demonstrate the starting of the center more than once. A good way is first to demonstrate and explain to the whole class; second, demonstrate and explain and have the children work with the teacher; and third, demonstrate to groups of the children who have not obtained results.

Directions for Making Mat.

In Fig. 1 are shown the eight steps in the making of the mat. The eight steps given below correspond to those in the illustration.

1. (a) Cut four spokes 10 inches long from the heavy reed (No. 2 or 3) and one spoke 6 inches long. These should be dipped in water but not soaked.

(b) Place spokes in position and hold with left hand. The horizontal spokes are in front and the vertical spokes behind. The spokes should be kept flat and not piled one upon another.

2. With the spokes in position, take a piece of raffia with the right hand, and holding one end with the thumb of the left hand, pass it around back of the vertical spokes at the top; then down in front of the horizontal spokes at the right; then back of the vertical spokes at the bottom (passing to left); then up and in front of horizontal spokes at left to the point of starting.

3. Raffia is now drawn tight and passed around in the same path two or three times more. The spokes should remain side by side and flat. If the work has been properly done thus far the spokes will be held together firmly by the raffia. If the spokes are loose or are piled up it should be started over.

4. Separate spokes so they will radiate from center with equal spaces between. (See Fig. 1, Upper Right Corner.) This is done by taking each spoke with thumb and forefinger and bending it sharply close to the raffia center. The dipping of the spokes which was suggested

in "Step 1" should prevent any breaking at this time.

5. Weave over and under with raffia, being careful to hold each spoke in place as you weave. When the one string of raffia is used up the center is completed and the spokes should radiate from the center quite evenly. If a pupil has succeeded this far he should have little trouble in completing the mat.

6. Prepare coil of No. 1 reed so about two feet will be ready to use. Begin with end of reed and weave over and under in same manner as with raffia. Each spoke must be supported with fingers of the left hand while the reed is being woven over and under with the right hand. If this is not done it will be practically impossible to weave down close to the raffia center, and to the adjoining reed weaver.

7. Continue weaving over and under until desired size is obtained. To start a new piece of weaver allow it to lap back on the old one about one or two spokes and trim the ends after the mat is finished. As the weaving proceeds the pupil should notice whether the mat is going to be true in shape, i. e., spokes equal distance apart and radiating straight from the center. In finishing, the end of the weaver is fastened by passing it down beside one of the spokes.

8. Decide what kind of a border you will make. (Two are shown in Fig. 1, Lower Right Corner.) When you have decided on the style of border cut the ends of the spokes to the required length. These ends may be sharpened with a knife and then passed down beside a certain spoke according to the pattern to be made. It will usually be necessary to dip the ends of the spokes before bending and pressing into shape. When every spoke is bent and in place, go over each one a second or third time, and make sure that each one is shaped correctly and like every other one. The border must be made nearly perfect if the result is to be pleasing, and it is not hard to do this.

Directions for Making Basket.

In Fig. 2 are shown seven steps in making a reed basket using reed to start the center instead of the raffia. If the teacher prefers the raffia may be used in starting any of the work. The seven steps given below will correspond to those in the illustration.

1. (a) Cut six spokes 14 inches long and one 8 inches long from the No. 4 reed. The length and number of spokes required in any basket may readily be ascertained after the size of the basket is known.

(b) With knife split three of the spokes at the center so the others may be passed thru and placed. The short spoke is sharpened and placed between two of the long spokes. (See Fig. 2, Upper Left Corner.)

2. With spokes held in position (with left hand) take winder of No. 2 reed and fasten end in split spokes in upper left corner. Then pass around back of the vertical spokes at the top; then down in front of the horizontal spokes at the right; then back of the vertical spokes at the bottom; then up in front of the horizontal spokes at the left to the starting point. Pass around twice or three times in same manner.

3. Open up spokes so they will radiate from center and weave carefully over and under.

4. Continue weaving until bottom of basket is of the desired size. Keep bottom flat while weaving.

5. Dip ends of spokes in water and bend each one up at right angles to the bottom. Each one should be kinked carefully with thumb and forefinger.

6. Proceed with the weaving of the sides of basket to the desired shape and height.

7. Determine kind of border to be made and trim spokes to the required length for that border. Dip ends of spokes in water and make border.

Several ways of finishing the top edges of baskets are shown in Fig. 3. Others may be made with a little practice and experimenting. Care should be taken to see that the finishing is well done while the reed is wet. When the basket is once finished and it has become dry it should not be necessary to wet it again to make any adjustments as to shape. The children should be taught to watch the developing form as the weaving progresses instead of trying to do the shaping after the weaving is done. It is usually better to trim off ends after the basket is finished so there will be no danger of them pulling out during the weaving and finishing.

BASKETS MADE BY CHILDREN UNDER MR. CURRAN'S DIRECTION.

COSTUME DESIGN AND ILLUSTRATION

Ethel H. Traphagen

(Concluding Article)

Points on Design: Hats.

WHEN seen from the side, the lines of the crown of the hat should not extend beyond the line of the forehead nor beyond the hair in the back. If the hair extends far in the back the hat should come between the head and end of hair in order properly to balance with the spinal column.

People with small or narrow faces require smaller hats than those with large faces to whom larger hats are becoming. Care should be taken not to accentuate undesirable lines or features by too strong repetition or opposition. Try rather to neutralize such.

The milliner's problem is allied to that of the sculptor insomuch as the effect is to be viewed from every side and according to Beau Brummel the most important part of a woman's hat is the back. Besides this the laws of proportion demand that we consider not alone the relation of the hat to the head, but also the relation of the head and hat to the entire figure. (For instance, head-gear too large for the figure gives a clumsy, awkward appearance.) Thus no matter what fashion decrees, the law of proper proportions for every individual should be sought out and obeyed even if it brings about a disagreement with the prevailing modes.

Points on Designing Hats.

The height of any hat, generally speaking, should not be more than three-quarters the depth of the face (that is, length of face from chin to eyebrows). The greatest width of a wide hat should not exceed three times the width of the wearer's face including the ears and hair at sides. The greater width is often at the left side.

The crown of a hat is very important and must appear to cover the head and also any puffs of hair. People with large heads should not wear hats with small crowns. On the other hand people with long thin faces and plainly arranged hair should wear hats with crowns wider than the width of their faces and hair.

If we are ever to overcome our bromidic tendency in dress we shall have to cultivate an appreciation of personality and character and become so proud of these that we will resist our hitherto sheep-like tendency to follow the modes even when they distort and caricature us.

In designing we must get away from the consideration of clothes as studies in the flat, and must aim to make them please us from every side. At the same time we must not lose sight of unity and must never let distracting details interfere with the center of interest which is usually the head. In other words we should aim to make the personality dominate the clothes.

For a most telling illustration of this last point study the paintings of Rembrandt. Note how all of his wonderfully thought-out textures and tones of garments are made subservient to his characterization, how all these lead up to the head and face and seem arranged to perfectly reveal the individuality of the sitter, his occupation, his walk in life and his inmost character.

An Example of Hat Illustration.

Books Helpful in Studying Costume Design.

Historic Dress in America, 2 vol., Elizabeth McClellan; G. W. Jacobs & Co., Philadelphia, Pa.

English Costume, 4 vol., Dion C. Calthorp; The Macmillan Co., New York.

The Heritage of Dress, Wilfred M. Webb; Times Book Club, London, England.

Fashions in Paris, 1797-1897, Octave Uzanne; Charles Scribner's Sons, New York.

Zur Geschichte der Costume, Wilh. Diez, C. Haberlin, M. Heil and And. M. F. Rothbart; Verlag von

Braun Schneider in Munchen, and G. E. Stechert, New York.

Greek Costume.

Cyclopedia of Costume, 2 vol., J. R. Planche.

Le Costume Historique, 6 vol., A. Racinet.

Costume, Fanciful and Historical, Mrs. Aria.

Dress Design, Talbot Hughes; The Macmillan Co., New York.

Color Harmony in Dress, G. A. Audsley; McBride & Co., New York.

Industrial Drawing, Edith C. Hammond; Redfield Bros., New York.

Pictorial Composition, Henry R. Poore; Baker & Taylor Co., New York.

Composition, Arthur Dow; Doubleday & Page, Garden City, N. Y.

MILLINERY IN SECONDARY SCHOOLS

Donna M. Drew, South Bend, Ind.

EFFICIENCY has become the password of this century, one might almost say. A girl is not thoroly efficient unless she has acquired knowledge in *all* of the domestic arts. Therefore this year we have introduced millinery as an important part of the Domestic Art course in the South Bend, Indiana, High School.

Style, and yet economy, has been our uppermost thought thruout the entire Domestic Art course. Is there any better subject by which to impress these facts upon the mind of the high school girl than by millinery?

The Junior girls take what might be called a preparatory course, which extends thru six weeks. They trim a hat, so that they may get the idea of the silhouette, of right balance, and color harmony, firmly established in their minds. When the Art Department correlates, as it so ably does in our High School, this part can be wonderfully developed, and proves most helpful to the girls.

In the Senior year the girls take what is known as the millinery course, which consists of two double periods twice a week—devoted exclusively to Millinery—and one single period a week, in which the study of textiles is pursued—the relation of all fibers to the finished product, and the processes thru which fabrics must go before they can become a "costume." This is taught for six weeks in the Fall and in the Spring, the remainder of the time being spent in dressmaking.

Particular stress is laid on the cleansing and renovating of old materials. Appropriateness and durability of trimmings are discussed, interest created in the Audubon society, and a plea made for the abolishment of child labor in the willow plume trade.

Of course to begin and end with millinery stitches are taught. The making of bandeaux, facings, folds, bows, in fact all that is necessary for a girl to know, to design, create, and produce a hat which is becoming to her, and *suitable* for the occasions for which she wishes to wear it. Is there anything more ludicrous, or really more pitiful, than an overdressed high school girl wearing a hat loaded down with cheap plumes and tawdry flowers? It is against this that we are working—striving to create within the girl a desire for the best of materials within the range of her purse, and for that appearance of simplicity which means a chic hat, and which designates so truly the well dressed woman.

At Christmas time the classes made the now popular corsage bouquet, using up scraps of silk and satin which they had at home. They also made American Beauty roses and bunches of violets out of ribbon. (See illustration.) These met with such a demand for immediate sale, that the girls were given an opportunity to reimburse themselves for what they had expended on their own hats.

Thus the millinery course is not an expensive one, and creates a keen interest, a better standard, and a far better appearance among the girls.

HATS DESIGNED AND MADE BY STUDENTS IN THE SOUTH BEND HIGH SCHOOL.

THE RELATION OF THE INDUSTRIES OF A COMMUNITY TO THE LIFE OF A COMMUNITY.

Wade A. Taylor, Pres. Deforest Sheet and Tin Plate Co., Niles, O.

PERHAPS the effect of the industries of a community on the life of that community can best be discussed by means of comparison.

In the watch making districts of Switzerland every home is a watch factory, the work being done almost entirely by hand, and being participated in by every member of the family, even the little tots three or four years old being given some of the cruder parts of the mechanism and a file and allowed to work out the parts of the movement, half in work and half in play; thus the children are literally born and raised as watch makers, and die as watch makers, and their children the same after them.

In the city of Leon, Mexico, the leather industry is worked in about the same manner. Every home is a saddlery and all the family work at the trade.

Among the Indians in Arizona, I have seen the father, mother, and little child, apparently five or six years old, each work in turn on a hand loom weaving a blanket, and whenever that member of the family who happened to be working on the loom would be called away by any other duties, some other member of the family would immediately take their place. Perhaps you have noticed in Oriental rugs and Indian baskets and blankets, a spot where the character of the work was quite different than in other parts of the piece. By looking closely, you can almost tell just when one of the older members of the family was called from the loom, and the place taken by one of the children, and if we were familiar with the speed of such work, we could tell almost to the minute just how long the father or mother was gone, while baby did the weaving.

Here we find the examples of industrial life organized on the basis of the smallest possible unit—*every home is a factory,* an independent industrial unit, and it naturally follows, and is true, that where the industrial unit is small, the community life is undeveloped, or, in other words, the development of community life is in direct ratio with the size of the industrial unit.

Where the industrial unit is relatively small, the wage bears the same relation, and it is perfectly natural that the wages of workmen would be small where the work is done in the home, as compared with the wages where the work is done in factories with Superintendents and Managers, and all the complexities of the larger and more complicated working unit. The working hours and working conditions, of wage earners of a community, have a very powerful effect on the extent and character of their recreation, and by recreation, I do not mean the word in a sense of "play" but in the larger sense of all of the activity of mind and body of a recuperative and upbuilding character.

If you take a bar of steel, say, for example, six feet long, one inch wide, and one-fourth inch thick, or any dimensions in fact, fasten one end of it tightly into a vise, allowing the other end to extend out horizontally, and then place a certain weight, not too heavy, on the end, the bar will bend down slightly at the end. Upon removing this weight, the bar will return to its former position. Then put on a heavier weight; the bar will go lower, but upon the weight being removed, it will again return to its original position; but you increase this weight successively until finally when you remove the weight, the bar will not return to its normal position. Why? Because the elastic limit has been exceeded and it has lost its power to return to its original normal position and shape.

Now, instead of fastening the bar in the vise, we will put a man or a child into a coal mine, working twelve hours per day, with a wage barely sufficient for a living existence and such a person will have neither time, strength, nor inclination for healthy mind and body building recreation, and long continued employment in such an environment will ultimately destroy the mental capacity to enjoy, or in other words, their elastic limit has been exceeded and they have lost the power to return to a normal physical and mental condition.

In a community where the industries are of such a character that men only are employed, the class of men are attracted to that community who are able to support their families without it being necessary for the other members of the family to do wage work, thus the younger members have opportunities for education and culture, which their parents have not enjoyed, and in an industrial community of this character, the tendency is to produce, in each successive generation, a higher type of individual.

In the steel industry, as represented in Niles, the highest type of workmen are found and they draw the highest average wage. Almost without exception, the work is done on three eight-hour shifts, giving sixteen hours out of every day for sleep and recreation. The wages are high and the hours are short, and thus the workmen in the steel industry find themselves and their families able to command the time, money, and ability to employ their leisure time in a manner which may appeal to them.

The most opposite condition to that of the steel worker, as found in Niles, is probably that of the worker in a cotton mill town of the South, where the company owns all the houses and the tenant must furnish a hand in the mill for every room in the house: where the father and all the children over seven or eight years of age, all work in the mills, where the combined wages of the family will not permit of the accumulation of a sum large enough to cover expenses of moving into a more favorable community; and where the death of the family necessitates moving into a smaller house.

In America, we do things on a large scale; as David Harum said, "A little too big is about the right size." The industrial unit is organized on the largest possible basis within the limits of efficiency and economy of results, and we keep making the unit larger and larger, doubling it several times in a single generation. As an illustration: When I first came to Niles one of the first things I heard was that the Thomas Furnace had just been rebuilt, and had been doubled in capacity, but could not turn out 100 tons of pig iron per day. That was in 1890. The Thomas Furnace was rebuilt several times in the following ten years, and by 1900 was turning out 300 tons a day. Today at the Ohio Works in Youngstown, the furnace stacks are averaging in the neighborhood of 700 tons each per day and there are furnaces in the United States which I am informed are turning out about 900 tons a day.

Other branches of the Iron and Steel Industry have double-doubled in the same manner, and the same is true of all our industries in the United States, and with this doubling and re-doubling of the industrial unit, we find also a doubling and re-doubling of those human activities which enlarge and extend the community life, i. e., those things which are done by the community and for the community.

It has been said that the limit of accomplishment is the limit of the imagination, and it is certainly true that before anything can exist in fact, it must exist in the imagination. The things we do in America are impossible to those who think only of possible things, but Americans can think the impossible thought, and hence can do the impossible deed. Naturally, then, when it came time for the Panama Canal, it fell to the lot of America to build it and it stands the crowning achievement of a generation which has done hundreds and thousands of impossible things because they were able to think in impossible terms; and when this American capacity for thinking the impossible is fully directed to the problems of community life, community conditions far in advance of the fondest hopes of the dreamers of the millennium will exist in fact.

Our part is to think the big thoughts which must precede the doing of the big things for our own community but not in a selfish sense, for our community will be just as large as our mental horizon will permit.

Address, Niles Teachers' Association.

INDUSTRIAL-ARTS MAGAZINE

EDITORIAL

TEACHER TRAINING.

THE demand for trained teachers of manual training and related subjects is a pressing one, and the need is still greater than the demand. The realm of manual training is continually being invaded by the graduates of engineering schools. After graduation, these men find the engineering fields crowded and as an after-thought they seek places as teachers of manual training, without preparation, either theoretical or practical, for the actual work of teaching. Eventually, they make good teachers, but only after a year or so of blundering and experimenting at the expense of the boys and girls. This results, of course, in incalculable waste and injury.

Furthermore, most schools that turn out teachers of the industrial arts, send them out with some mechanical knowledge and skill; but as a definite preparation in the art of teaching, with but little more than notebooks filled with theories and platitudes and with no adequate contact and experience with actual class instruction. More schools are needed with facilities for the giving of actual, continuous practice in real teaching and class management under the direction and criticism of competent supervisors.

We have been strenuously demanding that teachers shall have some actual experience in the industries which they propose to teach. Similarly, shall we not demand that they be given an opportunity to do a considerable amount of actual teaching under expert direction, before they are sent out into positions?

Who is the trained teacher? He is one who has had, in addition to the technical preparation in industrial work, an opportunity in supervised class instruction to try out his plans and theories, to have his faults and blunders corrected by wise criticism, and to feel the responsibility of the progress, or failure, of a group of boys and girls.

THE TEACHER'S VACATION.

As the weather grows warm, our business friends look upon the teacher with two months of vacation as privileged beyond reason. Their own brief fortnight off in August seems unjust in comparison.

The teacher whose living wage stops with June, and does not begin again until September, is not so certain of his advantage. There was a time when the nomadic teacher could peddle books or work at a trade and span over the payless summer season.

Now the school superintendent, and often the school board, look askance at the teacher who does not improve the shining summer hours attending summer school or otherwise developing himself for more efficient service next year. Indeed! it is rapidly becoming necessary for the ambitious teacher to look forward to a college degree. This is promising for the schools and for the profession of teaching but with increased expenses and unequal increase in salary, the teacher finds himself in financial straits that make of his vacation a season of extreme economy.

A few cases have come to our attention where school boards have voted expenses paid for teachers who would take advantage of summer school. This method of developing the standard of teachers seems at first thought to be just if not generous but, like the much discussed pension, on second thought it seems more like a poor substitute for adequate pay.

During the busy winter months our business friends are not jealous of us. They are better paid and the vacation is not in sight.

There is but one proper method of raising the standard of the teaching profession and commanding the ability which it demands, and that is to make it financially adequate as it is made professionally exacting.

COLLECTIONS AND EXHIBITIONS.

AT their annual meeting in Washington, the Federation of Arts voted particular commendation to the exhibition arranged by the Editors of "Good Furniture" in room 37 of the National Museum. This exhibit was a beautiful room furnished by selected contributions from American made works of industrial art.

In contrast to the other collections of American industries at the National Museum, room 37 was a work of art, as well as a collection of works of art. This does not imply that individual pieces of work in this room were better than those of other rooms. It would be impossible to surpass in one collection the beautiful tapestries, furniture, pottery and silverware shown by our best industries on this occasion. They were a revelation of American supremacy in Industrial Arts.

The remarkable success of room 37 does imply that a *well arranged* exhibition is far more effective than a collection of objects, however excellent in themselves. There is a valuable lesson in this for Industrial Art teachers. We are rapidly becoming efficient in the doing of particular things and in the making of particular articles in our schools; yet our school courses and our collections of school work lack unity of purpose. No article, however well made or artistic in itself can appear to advantage unless it is placed in a proper setting.

The next meeting of the Western Drawing Teachers' Association is to be held at Grand Rapids, the home of "Good Furniture." May it not be possible for this Association to set a standard for school exhibitions equivalent to the standard set by room 37 for American Industrial Arts?

FREEHAND DRAWING.

THE summer schools are now on. Many hundreds of teachers of manual training are striving to make im-

provements in themselves and their work by doing intensive work during the summer. This is indeed a very commendable thing!

If we were asked to mention a single course which would be most profitable to the manual training teachers generally, we could not mention one more important than freehand drawing. There is considerable lack of facility in handling the pencil and in the use of the simple principles of perspective. Given a teacher fairly well prepared in the technical work of the shop, there is scarcely anything which will increase his worth and efficiency in his teaching more quickly, and more decidedly, than a well taught course of freehand drawing.

HAVE YOU A VISION OF YOUR JOB?

In the report of the Committee of the Eastern Arts Association on "A Desirable Professional Status for the Manual Training Teacher," there is much which should receive considerable thought and cause some action on the part of the Manual Training teacher. Two criticisms seem especially worthy of consideration; first, "we have no real vision of our job"; and second, we are told by the vocational enthusiasts that "we are 'on the way' without knowing where we are going."

Have you a real vision of your job? Do you know where you are going or even where you want to go in your work? If someone should come into your department tomorrow and ask you to tell him definitely, the purpose of your work, could you give him an intelligent answer? If the schools of which your work forms a part should be "surveyed" by some organization, are you willing and ready to state the purpose of your work, or in the words of the report, do you know where you are going? After you gave your answer, could you demonstrate that you are, in a fairly satisfactory degree, accomplishing that purpose? As a rule, the aim which is stated in courses of study, is one or more of the following: To teach accuracy and honesty, to develop the whole boy, to give an appreciation of industry, to prepare the pupil for his future vocation, to interest the boy in his schoolwork, to enable the boy to make an intelligent choice of a career, as a preparation for the engineering college, etc. After having thus stated our aim, when some critic comes along and tells us that our work is not vocational, some of us lose our temper and say uncomplimentary things about the critic.

Teachers of manual training should get a vision of their job and state clearly what that job is and go to work in a systematic manner to accomplish their purpose. In other words they should set up a goal which they feel is the desirable one to attain, and then work toward that goal. If manual training is to maintain its place in the schools and is to survive in this country, its advocates must see to it that it actually accomplishes the results which are claimed for it. Some feel that the purpose should be general education, while others feel that the purpose should be the development of marketable skill or vocational training. But whatever purpose we may have for the work, we should see that that purpose is accomplished in some degree.

If our purpose is general education, can we justify the expenditure of the enormous sums of money which we are asking school boards to invest in school shops? Is a machine shop costing from $10,000 to $50,000 the *best* means of general education which that sum will buy? If our purpose is vocational training, are one or two hours a day sufficient for the development of the skill which we feel is essential? Why should that time be so thinly spread over so many different lines of work? If the purpose is experience on which to base the selection of a vocation, are the four or five lines of work which we teach sufficiently representative of the activities of industrial life to allow of an intelligent choice?

While there may seem to have been a cessation of hostilities on the part of the critics of manual training, we must not consider this permanent. Manual training is being submitted to tests of all kinds. Statistics have been gathered to show that the introduction of manual training has not caused the increase of attendance in high schools which has been claimed. In every survey one of the first departments investigated and criticised, is the manual training department. There are many reasons for this: Manual training departments are spending immense sums in machinery, tools and other equipment, and in salaries of teachers, and the public wants to know what it is getting for its money. Then too, the public is demanding vocational training in the schools, and it wants to know if manual training is giving that training. We feel that the same searching, skeptical, critical scrutiny which is being given to the manual training work should be directed to every other subject in the curriculum.

The obstacles in the way of making manual training more effective are largely administrative. They are conditions over which the teacher of manual training has no control. If manual training is to become vocational preparation, more time must be allowed for it. If various lines of shopwork in the high school are to be open to all pupils regardless of the number of years they have been in the school, principals and superintendents must modify their rules and regulations. The teacher of manual training cannot introduce short courses, open evening classes, and make other desirable innovations—these must be made by the administrators of the schools. However, he *can* use his influence in this direction, and by being familiar with the progress of industrial education, he can assist in forming public opinion in this regard.

The manual training teacher can make his teaching more effective; he can use the time which is allowed for his work, and the present equipment to the greatest possible advantage. When he has done this, and feels that he can use more time and equipment to advantage, then and not until then, can he reasonably go before those in authority and ask for additional time and equipment.

HOW IT WAS DONE!

The purpose of this Department is to present monthly a wide variety of shop projects which have been actually worked out in elementary, high, trade and continuation schools. Contributions are solicited and will be paid for—THE EDITORS.

A SILO FORM.

Louis M. Roehl, Milwaukee County Agricultural School.

ONE of the practical problems made by the boys, which involved both carpentry work and blacksmithing, was two sets of forms for concrete silos, the drawings and cuts of which are shown here.

On the carpentry shop floor was drawn a circle the size of the inside form. This circle was divided into an octagon and the ribs of the form laid out.

There were six parts to the wooden part of the forms, namely the ribs, sideboards, door splices, braces and posts. One form was built fourteen feet in diameter and the other twelve feet. The ribs of the fourteen-foot form were made of 2″ by 12″ white pine and those of the twelve-foot form were made of 2″ by 10″.

A plank was placed in the position which it was to have as one of the ribs for the finished form, and an arc drawn on it from the center of the circle. Both ends of the rib were then cut and the plank turned over; by turning the plank one cut did for both ends. In this way the sixteen ribs were laid out, cut on the band saw and placed in position.

The outside edges of the splices were sawed to the same arc as the ribs and held in position by four ½″ by 4½″ machine bolts, with two washers each. Machine bolts are preferable to carriage bolts as a wrench may be used on both ends, when the forms are being assembled or taken down.

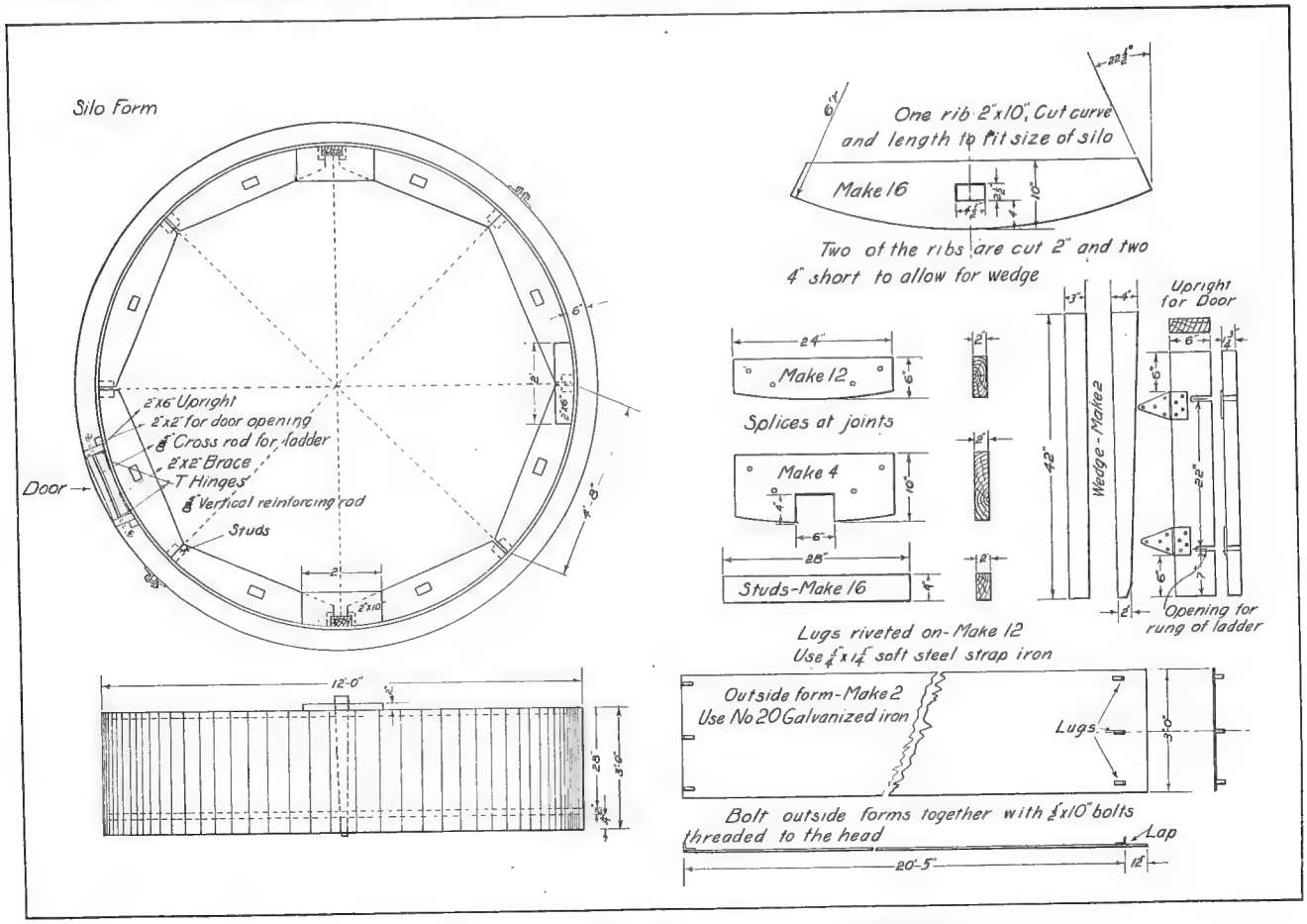
The braces are simply 2″ by 4″ pieces spiked in place.

The posts are not shown in the drawing. Two pieces 2″ by 4″ by 18′ go with each section. These were placed vertically thru the 2″ by 4″ holes in the rib and served as scaffolding on which the forms rested. An iron pin was placed thru each post, under the bottom rib of each section. When the silo was eighteen feet high another set of 2″ by 4″ was bolted to the first, or lower set. The forms may be elevated to 36 feet which is as high as is usually recommended.

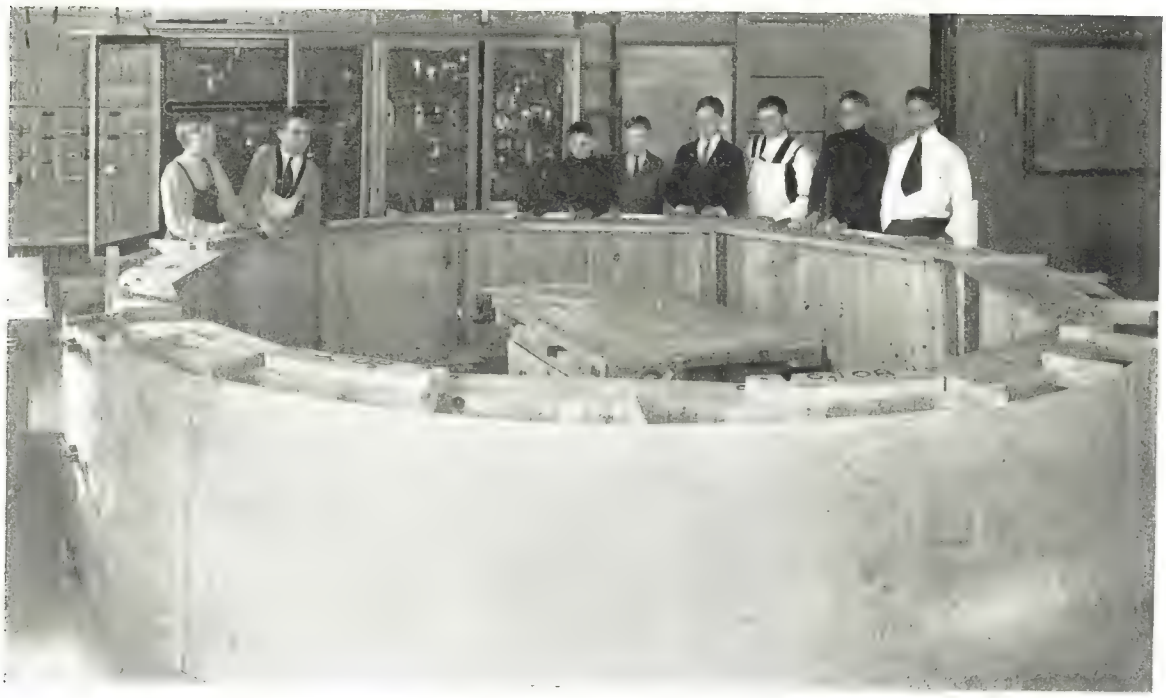
The most interesting part of the construction was the door. The problem was to devise a way of making a continuous door, the height of the silo, with ⅝″ iron bars extending across the opening so that they could be used as rungs of a ladder, and the spaces between them large enough to admit a person and large enough for the ensilage to be forked out at any height. Both ends of each bar were bent and fitted around a vertical re-enforcing rod on each side of the opening.

It was accomplished as shown in the drawing by nailing two pieces 2″ by 2″ on one rib, and by fastening two pieces 2″ by 6″ with heavy T hinges to form the sides of the opening. The 2″ by 6″ pieces were held apart by 2″ by 2″ braces placed between them. The pieces had notches cut in them to admit the iron cross pieces. When the concrete in the forms had set, the braces were removed from between the 2″ by 6″ and they were swung on their hinges free to move up clear of the iron cross members. The 2″ by 2″ pieces on the outside of the inside form made a recess in the doorway for the 2″ door which is placed there when the silo is filled.

By placing the notches at the measurements shown in the drawing, the rungs of the ladder were alternately 22″ and 7″ apart when the silo was complete. The notches might have been placed so that the rungs would have been



DETAILS OF SILO FORM. MADE BY MR. ROEHL'S STUDENTS.



THE COMPLETED SILO FORM AND THE CLASS WHICH MADE IT.

15″ or 30″ apart. The former would have been too close to admit a person and the latter too far apart to be used as a ladder.

The outside forms were simply No. 20 gauge galvanized iron. The blacksmithing consisted of making twelve lugs for each silo, drilling three ¼″ holes for the rivets and one $\frac{5}{16}$″ hole for the draw bolt in each. The draw bolts used were ½″ by 10″ and were threaded to the head.

A farmer has rented the fourteen-foot form and wants to begin work immediately. He says he has enough neighbors, who want it, to keep it in use all summer.

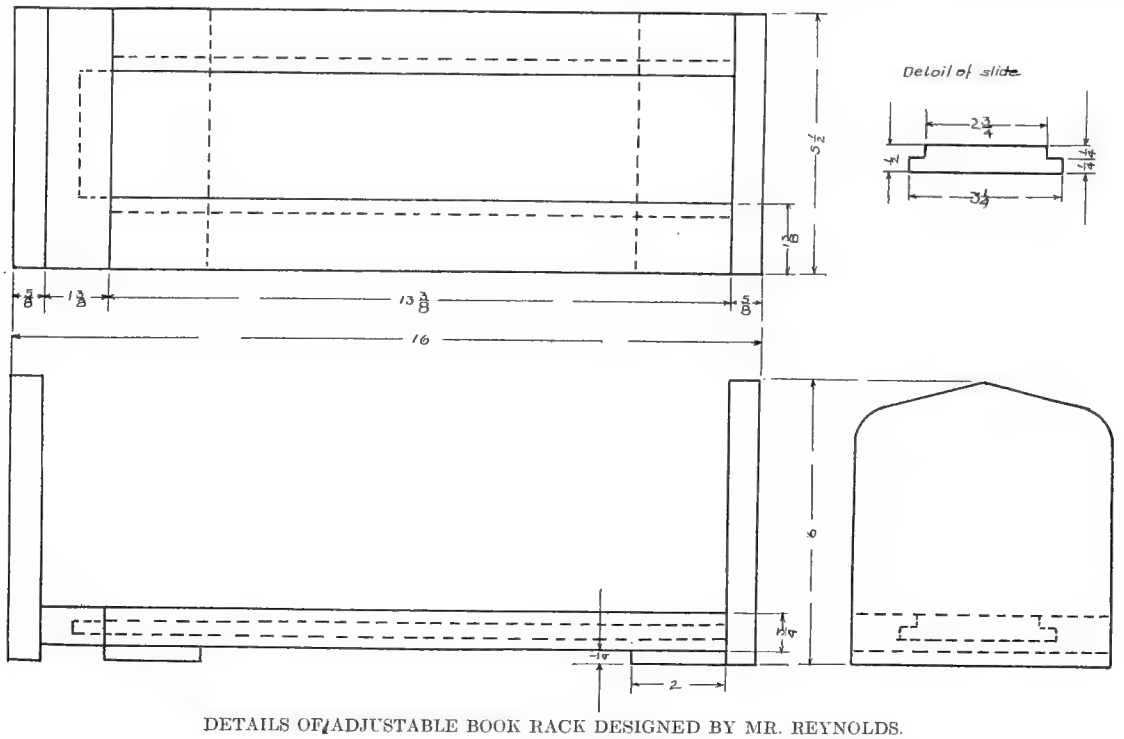
The boys have enjoyed the work and seemed to feel while building it, that they were doing something worth while.

SLIDING BOOK RACK.

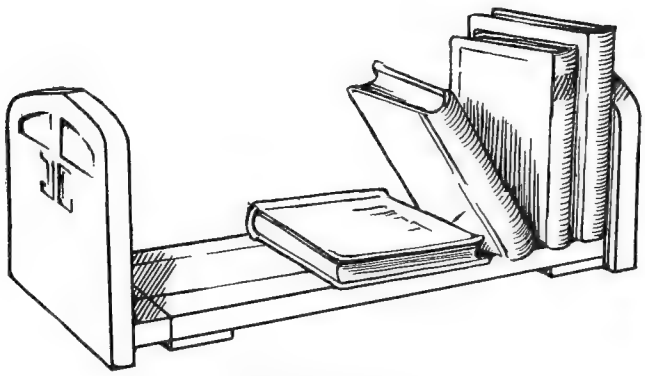
J. C. Reynolds, State Normal School, Fredonia, N. Y.

THE sliding book rack was designed for use in the eighth grade and seems to be particularly well adapted to the ability of such boys. It has the advantage of involving a maximum of workmanship on a minimum of material, and the result is both practical and pleasing.

The ends are to be designed by the pupil. The designing includes both the shaping of the ends and the making of a satisfactory applied design. This may either be outlined with a veining tool or carved more elaborately if the ability of the boy seems to warrant it. Some very attractive racks have been made of birch finished in mahogany; others have been constructed of oak, using pieces for the ends particularly selected for their mark-



DETAILS OF ADJUSTABLE BOOK RACK DESIGNED BY MR. REYNOLDS.



Adjustable Book Rack.

ings. The grain of the wood in this case is the only decoration. It would seem that the ends would be best designed in the drawing classes and brought to the shop for application.

The grooves and rabbets in the pieces constituting the slide and rails are made with a universal plane. A mortise is cut into the crosspiece at the left (see drawing) and the end of the slide is inserted here. The ends may be fastened either with hinges so that they can be laid flat, or with ornamental screws into the slides.

DOMESTIC SCIENCE ON WHEELS.

An experiment to solve the difficult problem of teaching domestic science in rural schools which have not trained teachers, or equipment, is being made in Webster County, Ky., by Mr. A. L. Lloyd, County Superintendent.

DOMESTIC SCIENCE WAGON IN KENTUCKY.

A wagon containing a complete kitchen and dining-room outfit has been built and equipped to travel from school to school. An expert teacher is in charge to give lessons and lectures, not only to the pupils but also to their mothers and older sisters.

The wagon is divided into two sections, a dining room measuring seven by nine feet, and a kitchen measuring six by seven feet. The rooms are each supplied with a sufficient number of windows. The floors are of hardwood and the ceilings and side walls are of wall board covered with sanitary paint.

The wagon travels from school to school. At each school, the supervisor, Miss Mary Paris, gives demonstrations to which the people of the surrounding district are invited. Classes are formed among the young ladies and housewives, and improvement leagues are organized to assist the pupils and to bring about a better school spirit. The wagon visited twelve schools during the spring, remaining from one to two or three weeks at each school.

A High-School Course.

Boston, Mass. Upon the recommendation of Supt. F. B. Dyer, the board has adopted a course of study for the first two years of a four-year industrial course in the high school. The course is as follows:

First Year.	Periods	Points
English	5	5
Industrial Mathematics	4	4
Bench work (including two periods of Mech. Drawing and prepared work)	10	7
Industrial Science (Elementary)	3	3
Physical Training (Military Drill)	2	2
Hygiene	1	1
Music—Elective		
Totals	25	22

Second Year.

(Co-operating with commercial or school shops and possibly to receive State aid.)	Periods	Points
English	5	2½
Industrial Mathematics	5	2½
Bench Work (prepared)	2	1
Industrial Science (non-mathematical, Physics	4	2
Industrial Geography	3	1½
Mechanical Drawing (Drafting), two prep., three unprepared	5	1½
Physical Training (Military Drill)	2	1
Co-operative Shop Work—Full Time	..	10
Music—Elective		
Totals	26	22

Prosperity and Education.

"There is nothing that will set a man right with his fellow-men like prosperity, and there is nothing that will give him the capacity for prosperity like education for his own life work. Education of a general character has never and cannot now serve the vast army of industry.

"One speaks of "keeping very busy"; another says he is working hard; another says he "toils from morning till night"; another says he is "slaving his life away." They are all doing just what they say they are doing, and all because of the point of view fixed by their knowledge or lack of knowledge of their work, and their capacity. The man who has education that fits his needs says he is "busy," because that education gives him the intelligence to understand his true relation in the world, and he becomes happy in striving to rise. This illustrates the necessity of education, adapted to the needs of all, and not simply for a part, no matter how important that part may be."—*Chas. H. Norton, Norton Grinding Co.*

BRIEF ITEMS OF INTEREST

CORPORATION SCHOOL CONVENTION.

THE third annual meeting of the National Corporation School Association was held in Worcester, Mass., from June 8 to 11. The sessions were presided over by Mr. Charles P. Steinmetz of the General Electric Co.

The association considered five main topics: Trade apprenticeship schools, vocational guidance, vocational instruction in public schools, office work schools and employment plans.

In considering apprentice schools, the report of a committee was presented, including a tabulated statement of replies to a large number of questions on the standards and practices of shop schools. It was made clear that rather well established principles of teaching and management, not unlike those employed in the regular schools, must underlie the conduct of successful apprentice schools. The welfare of both the workman and the shop must be conserved.

The work of the public schools in offering pre-vocational courses came in for lively discussion. The need of close co-operation between the industries was emphasized. The failure of the schools in places was laid to the absence of co-operation and the interference of political influences.

In discussing vocational guidance, the convention repeated the need for help in choosing a calling, but questioned the value of the plans now in vogue.

Twenty-five shop schools were represented at the convention by exhibits of classwork, lesson sheets, outlines of courses, etc. More than 200 delegates were in attendance.

The association elected as its officers: President, John McLeod, assistant to the president of the Carnegie Steel Co., Pittsburgh; vice-presidents, H. Tilly, general manager Strawbridge & Clothier Co., Philadelphia; Harry Tipper, advertising manager The Texas Co.; executive committee, J. W. L. Hale, Pennsylvania Railroad; Louis L. Park, American Locomotive Co.; W. D. Kelley, Consolidated Gas Co., Brooklyn.

The executive committee at its first meeting will name F. C. Henderschott, of the New York Edison Company, secretary, and George B. Everitt, formerly second vice-president, treasurer.

The following extracts from papers read at the convention indicate the trend of the discussions:

What the Association Stands For.

"The association stands for the modification of the public school plans, so that they too will turn out boys and girls who are better qualified for the duties of their life task, and fit them for their job, making them at the start self-supporting and self-respecting. They stand for opportunity—opportunity to the employer and opportunity to the employe. Increased efficiency of the worker benefits him directly as well as his employer.

"They stand for co-relation of educational system and the business world, and it is time that our educational system is so adjusted as to bring it into closer touch with the business world. We are improving in various lines, and the trend of times is in this direction, but the application of the proper relationship between school and business has not yet become effective. The National Association of Corporation Schools hopes to be able, in a degree, to bring this about."—*Howard W. Dunbar, Norton Co.*

President's Address.

"The trade apprenticeship courses of corporations and the industrial education of the public schools at first appear to be in competition with each other, but in reality the problem of the trade apprenticeship can be solved only by the co-operation of the corporation and the public school, as was proven by the experience in the professions. Once it was customary for a young man to go into an engineering office to learn engineering, into a law office to study law, etc. Experience has eliminated this as giving too narrow and limited knowledge, and the engineering college, the law school or medical school now are the avenues of approach to the profession. But experience also has shown that the graduate of the engineering school is not an engineer, the graduate of the law school or medical school not a lawyer or physician, but merely prepared to enter the practical part of his professional education in the industry, the law office or the hospital. Applying the same to the trades we see that the practical trade training must be given in the industry, by the corporation apprentice course, but the public schools must do the preparatory work.

"The field of the corporation school is the industrial training of those fitted for the industry. The field of the public schools is the general education, that is, to supply that minimum amount of knowledge which every intelligent citizen must have before he can specialize in trade or profession, or at least that part of general education which is difficult to acquire afterwards. With increasing civilization, the requirements of general education also have increased. With increasing population density and the growth of cities, physical development, hygiene and medical supervision become essential parts of public education, and familiarity with the use of the most common industrial tools, such as hammer, saw, etc., which formerly was acquired in the home, has to be taught by manual training in the schools. This increasing general educational demand on the schools precludes the possibility of industrial training, that is, of teaching a trade, within the limited time of mandatory school attendance, and industrial or vocational training thus must be continuation school work, while manual training, giving a general familiarity with the common tools of industry such as every man should possess, belongs in the grades as a mandatory subject. This sharp distinction between manual training and industrial education is not always realized. Industrial training belongs in, and can be efficiently accomplished only by the industry, by corporation apprentice courses taking the place of the former individual apprenticeship or by co-operative systems of public school and corporation; vocational continuation schools, technical high schools, etc., can be of limited usefulness only, but the new field of the public school is to establish an intelligent system of vocational guidance based on the teacher's familiarity with the pupil's characteristics, and especially on the adaptability and interest shown in manual training, so as to lead the pupils into those trades and professions for which they are adapted, and in which they can find the satisfaction resulting from success.

"The limitation of the corporation activities in the educational and similar fields necessarily is that given by the limitation of the corporation purpose; to earn dividends for its stockholders; no human activity can be justified before the stockholders' meeting which does not show a favorable financial balance, however much the corporation directors may desire philanthropic work. This is often difficult, as the beneficial results are largely "intangibles," and it must be proven to the satisfaction of the administrative heads of the corporation that these benefits are very real, consist in the better relation between corporation and employes, their higher efficiency and better co-operation, the lesser liability to interference by industrial warfare, etc. Also, we must realize that the right of existence of the corporation is challenged by a considerable part of the public, and self-defense justifies the expense of activities bringing home to the public the benefits which can be derived from corporate industrial organization.

Panel in Eastern District High School, Brooklyn, New York City. Mr. Frederick L. Stoddard, Painter.

"The human activities of the corporation are co-operative with its employes, and the favorable attitude and viewpoint of the employes thus is essential for their success. Herein lies the cause of many of the failures. It is not sufficient for the corporation to undertake such educational, welfare and other activities, as are in the opinion of the corporation managers for the best interest of the employes, but the corporation actions must be such that the employes and their organizations take the same viewpoint, otherwise welfare work may be resented as charity, educational work opposed by the suspicion of an ulterior motive hostile to the employe's interest, as an attempt of breaking down their organization, safety regulation as an attempt to evade responsibility, etc.—*Dr. Charles P. Steinmetz, General Electric Co.*

Why Some Corporations Maintain Schools for Their Employes.

"1. The instruction and training received in schools by the large proportion of young people seeking employment is, and must be, general in its character. The service required by the corporation is specific. The schools do not know anything about this specific service; in most cases no one but experienced employes of the corporation know of the details of the service. It goes without saying that the schools cannot teach what they have no means of knowing. Therefore, if employes are to be trained to enter upon a special service with some degree of efficiency at the start, they must get this training from the only source from which it can come—namely, the corporation.

"2. The requirements of the corporation may be such as to demand not simply knowledge and expertness in a single operation, or in a single department, but also a comprehension of the relations of this simple or special operation to other and allied subjects. This again may involve matters which only the corporation knows.

"It may be more advantageous and profitable in the end for the corporation to maintain a school as a means of imparting the needed knowledge, than to try to secure it by the slow process of experience unaccompanied by special instruction under the direction of an expert employed by the corporation for that purpose.

"3. There is a possibility that the corporation schools may by way of suggestion as to the real needs of their employes, be a stimulus and help to the public schools to make the preparation of pupils in grammar schools who expect to enter the industries, more thoro in certain lines, or plan courses better adapted to prepare these pupils for positions in the trades or industries which they are destined to enter.

"The same principle holds with regard to the influence which the corporation schools, thru the work of the National Association, may have with the higher institutions of learning."—*George I. Alden, President, Norton Co., Worcester, Mass.*

MURAL DECORATION OF NEW YORK HIGH SCHOOLS.

The art department of New York City high schools has made serious efforts during recent years to interest a number of organizations in the decoration of high schools with mural paintings. The Municipal Art Society has lent its aid to the decoration of the Washington Irving High School, Manhattan, and the Beaux Arts Society to the development of a competition for paintings for the foyer of the De Witt Clinton High School, Manhattan.

In addition to these the Mural Painters Society has, thru Mr. William Laurel Harris, its one-time president, assisted the general organization of the Eastern District High School, Brooklyn, in securing three large panels which have recently been installed on the entrance stairway of the school. These panels are the work of Mr. Frederick Lincoln Stoddard, who is well-known for his mural paintings in the City Hall of St. Louis, his stained glass window in St. Michael's Church, in New York, a number of mural panels in the St. Louis High Schools, and a large lunette in the large Hebrew Technical School for Girls in New York City.

The three panels painted by Mr. Stoddard for the Eastern District High School, are each some eight feet wide and twelve feet in height. They represent the Birth and Development of Education, the left panel showing the Gift of Fire to man, with Prometheus bound upon a rock in the background and man reaching forward toward enlightenment, which is symbolically represented by the flame, while the animal world is typified by a snarling tiger shrinking from the blaze.

The central panel, recently shown in New York City in the Exhibition of Civic Art arranged by the Municipal Art Society, shows the Dawn of Civilization with Truth holding aloft a torch, and in the foreground, man at work upon the first piece of pottery, while the family help to subdue Brute Force which is here symbolically represented by a recumbent lion wreathed in flower chains which a child is drawing round it.

The right hand panel shows the Birth of the Alphabet where the earliest student is scratching with a broken spear the first letters upon a rock. Behind him warriors sneeringly look upon the first steps of learning, while in the foreground a serpent shrinks from the light of education which blazes before the writer.

STATE SUMMER SCHOOLS IN PENNSYLVANIA.

The State Department of Education of Pennsylvania will open on July the 19th, at Philadelphia, Pittsburgh, Scranton, Erie, Reading, and Altoona, summer schools for teachers, the object of which will be to train teachers for

service in the continuation schools, provided for in the Cox Child Labor Act recently enacted in the State Legislature.

Mr. Millard B. King, head of the Vocational Bureau of the State Department, realizing it would be difficult for the various school districts of the state to secure properly trained teachers for this type of school, planned with the state board the establishment of these summer schools to aid the local boards.

All qualified teachers who have had one or more years of successful teaching experience in Pennsylvania are eligible for entrance. While men are preferred, women who meet the requirements will be admitted. No tuition is to be charged for the course; the commonwealth paying the salaries of all teachers and janitors, and furnishing all the supplies necessary for the proper conduct of the schools. The Educational Boards of the various cities are to furnish the schoolroom and the equipment of the industrial department.

Examinations are to be given in the Fall by the Bureau of Vocational Education in the special subjects that are taught, and each teacher who passes the test will be granted a certificate giving him the right to teach in the Continuation Schools of the State.

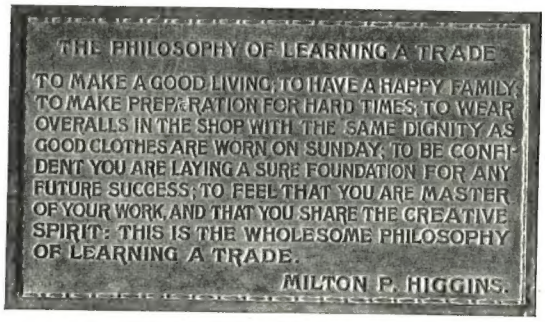
The following is the schedule of the work to be done:

I. Academic Subjects:
   - (a) English—Letter writing, spelling of trade names, reading of semi-technical trade articles, writing of compositions on vocational subjects.
   - (b) Industrial Geography—Sources and distribution of raw materials, manufacture, transportation and sale of the finished products.
   - (c) Hygiene for the Worker, personal hygiene, safety first.
   - (d) Civics—Relation of employer to employe, local government, state and national government.

II. Fixed Vocational Subjects:
   - (a) Industrial Mathematics.
     - (1) Arithmetic adapted to the industries.
     - (2) Industrial Bookkeeping.
   - (b) Shop sketching, including freehand and mechanical drawing.

III. Schedule:
   - (a) 8:00- 8:30 Industrial mathematics.
   - (b) 8:30- 9:00 Pedagogy adapted to the continuation school.
   - (c) 9:00- 9:45 English.
   - (d) 9:45-10:30 Hygiene.
   - (e) 10:30-11:15 Civics.
   - (f) 11:15-12:00 Industrial Geography.
   - (g) 12:00- 1:00 Recess.
   - (h) 1:00- 2:30 Shop Sketching.

—*W. E. H.*



IN MEMORY OF MR. HIGGINS.

Two bronze tablets perpetuating the memory of the late Milton P. Higgins as a mechanic, manufacturer and educator, have been placed in the vestibule of the Worcester Boys' Trade School. The tablets are the gift of the Higgins family to the school which Mr. Higgins caused to be established.

The tablets were unveiled with appropriate exercises on June 7th, in the presence of a large gathering.

Minneapolis, Minn. Factory garment making has been added to the subjects taught at the Girls' Vocational School. The course will be open to girls who have completed the seventh grade and will be conducted under the trade agreement recommended by Dr. C. A. Prosser. The Minneapolis manufacturers have signed an agreement binding themselves to hire the girl graduates of the course, at an initial wage of not less than $8 per week. The course will cover two years in the school and one year in the factory.

Oshkosh, Wis. Mr. L. P. Whitcomb has been reappointed as Director of the Continuation School, and Mr. P. J. Fink as instructor in Manual Training.

Miss Pearl L. Bailey, Supervisor of Domestic Science, St. Paul, Minn., was recently married to Mr. F. L. Lyons of Minneapolis.

NEW BOOKS AND PAMPHLETS

Practical Drawing Books.

Practical Drawing Publishing Co., Chicago, St. Louis, and Dallas.

The course consists of eight books of 40 pages each—36 pages of pencil and brush drawings and illustrations and four full pages of color designs and illustrations.

The books are adapted to instruction in drawing, design, and construction work in the eight grades of the common schools. Teachers' manuals accompany the set of books and explanatory notes are printed in conjunction with the illustrations.

The books are attractive in appearance and practical for schools in which the work is taught by regular teachers.

Manual Training Course in Concrete.

99 pages. Price, 25 cents. Association of American Portland Cement Manufacturers, Philadelphia, Pa.

An interesting and complete discussion and illustrations of the various uses of cement.

Household Science and Arts.

By Josephine Morris. 256 pages. American Book Co., New York.

The author's aim has been to put into simple non-technical language full suggestions and directions for proper housekeeping and to formulate about 350 recipes well within the reach of the typical American home. The book covers two years of work.

One interesting feature of the form of the material is the arrangement of the recipe in a narrow column alongside of the directions.

Art Course, Chicago Public Schools.

Set of Five. 1914 Edition. Price, 60 cents. Scott, Foresman & Company, Chicago.

This set is made up of a book for each of the last five grades of the elementary school. Each book of about thirty pages is simply a collection of plates showing a number of specimens of art work. The set is entirely without text matter, except for the small handbook for the teacher.

For wise selection, splendid execution of original drawings, and excellent reproductions of masterpieces, these books are a real joy to examine. The material has been selected with great care, and excellent taste and judgment, from the various schools and museums all over the country, giving a richness and variety difficult to equal. The selection and arrangement of material and most of the original drawings were the work of members of the art department of the Chicago schools.

Every phase of drawing, illustration, design and painting is represented by groups of excellent examples. Design in its application to such crafts as pottery, modeling, weaving, wood carving, and other forms of handwork is fully shown in numerous plates, many of which are reproduced in exquisite colors.

Under the present arrangement, the books may be bought by others beside those connected with the Chicago schools.

As books to place in the hands of pupils as an exhibition of what is good in art and to hold before them as standards of excellence, these books merit a wide use in the public schools.

Lectures on Electrical Apparatus and Experiments. Paper, 103 pages. Weston Electrical Instrument Co., Newark, N. J. A valuable bulletin prepared primarily for teachers of physics. It describes and illustrates the discovery of the most important principles of electricity and their application to modern electric testing and recording instruments. Fifteen experiments made in school laboratories are included. The pamphlet will be heartily welcomed by teachers of trade and evening classes in electricity.

The Duluth School Report, for the year ending June, 1914, has just been printed by the Manual Training Department, under the supervision of Mr. Edward F. Geiger. The document contains 87 pages of text and a number of plates illustrating the exteriors and interiors of the Duluth school buildings. The composition, which includes a large number of intricate tables, and the presswork, are equal to the best commercial work.

A Survey of Opportunities for Vocational Education In and Near Philadelphia. Compiled by Jane R. Harper and published by the Public Education Association, Philadelphia. A complete, analytic list of 180 institutions offering over 250 subjects having a vocational bearing for industrial, commercial and professional training. It has the merit of being complete, understandable and well arranged for reference.

Industrial Survey of Cincinnati. A study of the industrial situation in the printing trades and of the vocational education necessities of the same. Published by the Cincinnati Chamber of Commerce. Price, fifty cents.

NOW, ARE THERE ANY QUESTIONS?

Readers are urged to ask questions concerning the Industrial Arts. The editors will reply to those questions which they feel that they can answer, and to other questions, they will obtain replies from persons who can answer them authoritatively. Questions should be addressed to THE EDITORS.

Manual Training.

Iowa. Q:—Should fourth-grade manual training be taught in the shop, or in the classroom?—*J. C.*

A:—Assuming that it is of the lower grade construction type, presumably in the classroom.—*F. D. C.*

Mechanical Drawing.

Madison, Wis. Q:—(1) To what extent should geometric problems or constructions be taught in a high school course in mechanical drawing? (2) Should bevel gear drawing have a place in a high school mechanical drawing course?

A:—(1) Only as an interpretation of their applicaiton in working drawings. A very few abstract problems are needed. (2) As a part of advanced machine drawing, including elements of machine design. Place, probably junior year; possibly, last of sophomore year.—*F. D. C.*

Melting Brass.

Peru, Neb. Q:—How can brass be melted on a forge?—*O. J. H.*

A:—Put the brass to be melted into a Joseph Dixon crucible of the desired size, and place it into a well burned and large forge fire.

The coke should be well packed around the crucible and a slow blast maintained. The crucible should be raised once in a while and coke poked under it. Small blocks of pine wood may be put into the crucible to give more heat and also exclude the air from the metal. As the metal begins to melt a little more blast is turned on so as to force the heat. When the brass is melted the crucible may be lifted out of the fire with tongs and poured.

It requires some little time and a lot of attention to melt brass in a forge fire. The cold blast must not come in contact with the crucible and a well burned bed of coke must be kept under crucible all the time.—*Thos. Googerty.*

A Ferry?

New Jersey. Q:—I would like to know some practical way in which to build a ferry or otherwise connect a small island with the mainland. The island is about one hundred feet from the shore. I wish to connect the two in some inexpensive way so that I may go to and fro, and also establish my ownership to fishermen and others.

There is to be a sort of rest house on the island for patients of the hospital on the mainland and I am trying to find a suitable way to connect the two without having to build a bridge.

If you can help me to find out how this may be done, or tell me where I may obtain the information I need, I shall be greatly obliged to you.—*Manual Training Teacher.*

A:—The editors of the MAGAZINE will be glad to print any suggestions which readers may be able to make to solve the above problem.

Polishing Pebbles.

Q:—I have some pebbles that were picked up out West. I can use these in jewelry work if polished. Please give me some information about polishing them.—*P. W.*

A:—Fasten the stone with shellac on the end of a short bar of iron that is somewhat smaller than the stone. The best way to do this is to warm the end of the iron, put dry shellac on it, and then press the stone into the melted shellac. Do not have the iron hot enough to burn the shellac. If the stone is not of the proper shape or size, grind it on a fine carborundum wheel.

To polish the stone, place the bar in a vise with the stone end up. Charge a strong piece of cloth with water and medium carborundum and rub over the stone until a smooth surface is obtained. Then use a new piece of cloth, with pumice stone, and finish the polish with oxide of tin.—*Thos. F. Googerty.*